ELECTRICAL CONTRACTING

SEPTEMBER, 1937

With which is consolidated The Electragist and Electrical Record
Established 1901

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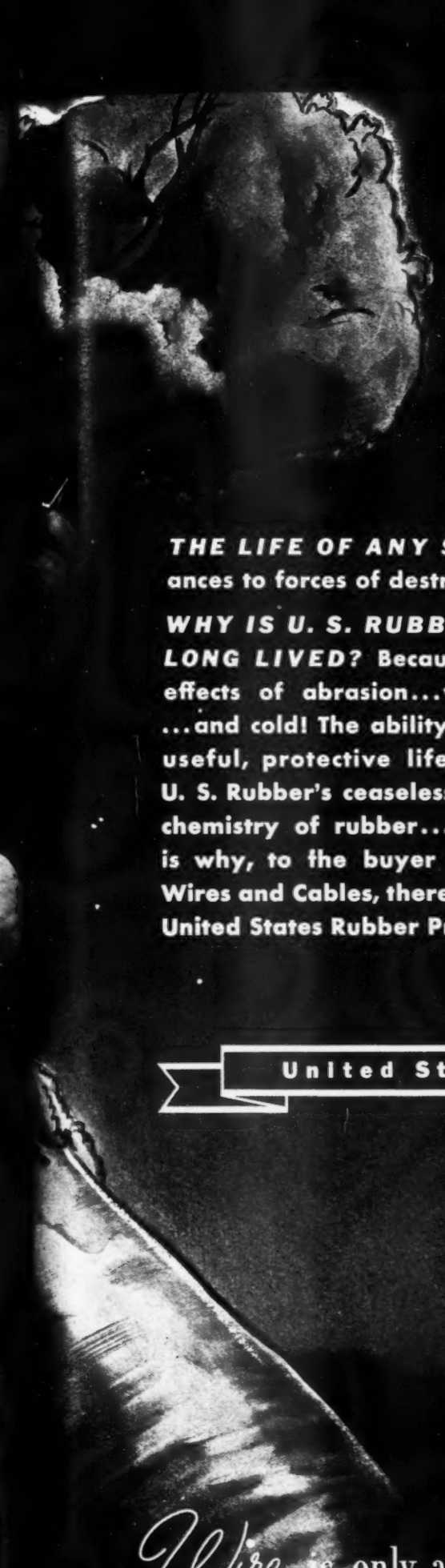

Wire is only as good as its Insulation

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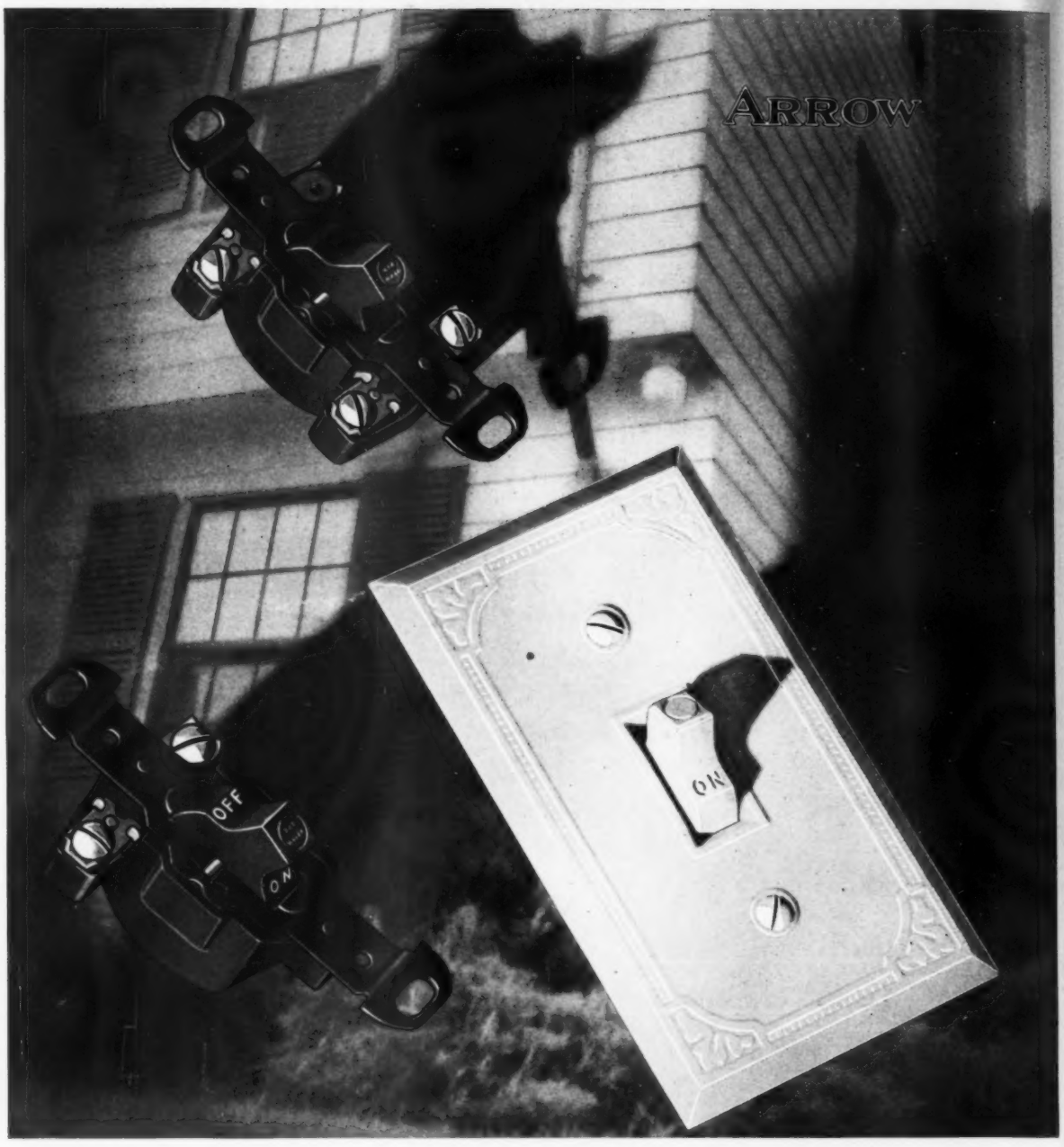

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ELECTRICAL CONTRACTING
SEPTEMBER, 1937

No Chocolate Sauce

THERE IS A LOT OF SATISFACTION at times in not getting what you want. A chap I used to know made it a fine art. Whenever he scanned a menu, that failed to stir his gastric juices, he ordered cold mashed potatoes with chocolate sauce.

OF COURSE HE NEVER GOT IT. He didn't want it. But it gave him a pleasant grievance and, even if his dinner was good, he didn't have to like it. It is something like the perennial argument over the National Electrical Code.

NOBODY SAYS THE CODE IS PERFECT. The Constitution of the United States already has a whole litter of amendments. The Code continues to be merely as good as we can make it, at the time—and times keep changing. But the Code makes wiring safe!

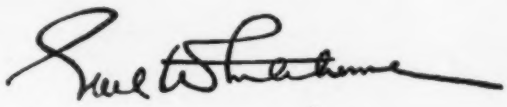
THE POWER COMPANY MEN ARE CONTINUALLY COMPLAINING. It is probably a good thing. Like the fleas on Fido, it keeps the code-makers awake and scratching. But this criticism goes too far. It clamors for cheapness and for simplicity that would make the Code indefinite and futile.

A RECENT PROPOSAL FROM THE UTILITIES was presented at the EEI Convention by E. T. Gushee of Detroit. He is a charming and intelligent gentleman. I like him. But he implies that present code rules are based on "imaginary risks and improbable conditions." He asks for a two-part code—1. the "simplest possible set of rules to protect against hazard"; 2. a "manual with illustrations, showing ways of complying with the basic rule". But if he got it, it would demoralize electrical construction.

INSPECTORS MUST HAVE RULES that are definite—the same in Boston and Los Angeles. Like policemen, they must know what is the law—and approve or condemn accordingly. If they are free to use their judgment, chaos follows.

SO THE NEW EDITION OF THE CODE—to be distributed this month—is specific and binding. But it is also more liberal and stimulating in its new form. It states fundamental objectives and sets forth the recognized methods to achieve them. It clearly urges that efficiency and convenience may call for more than these minimum standards.

ALL ELECTRICAL MEN SHOULD GET BEHIND THIS CODE—and build with it. We want economy. We want flexibility. We want progress. But we must have safety! And there is no use asking for chocolate sauce.



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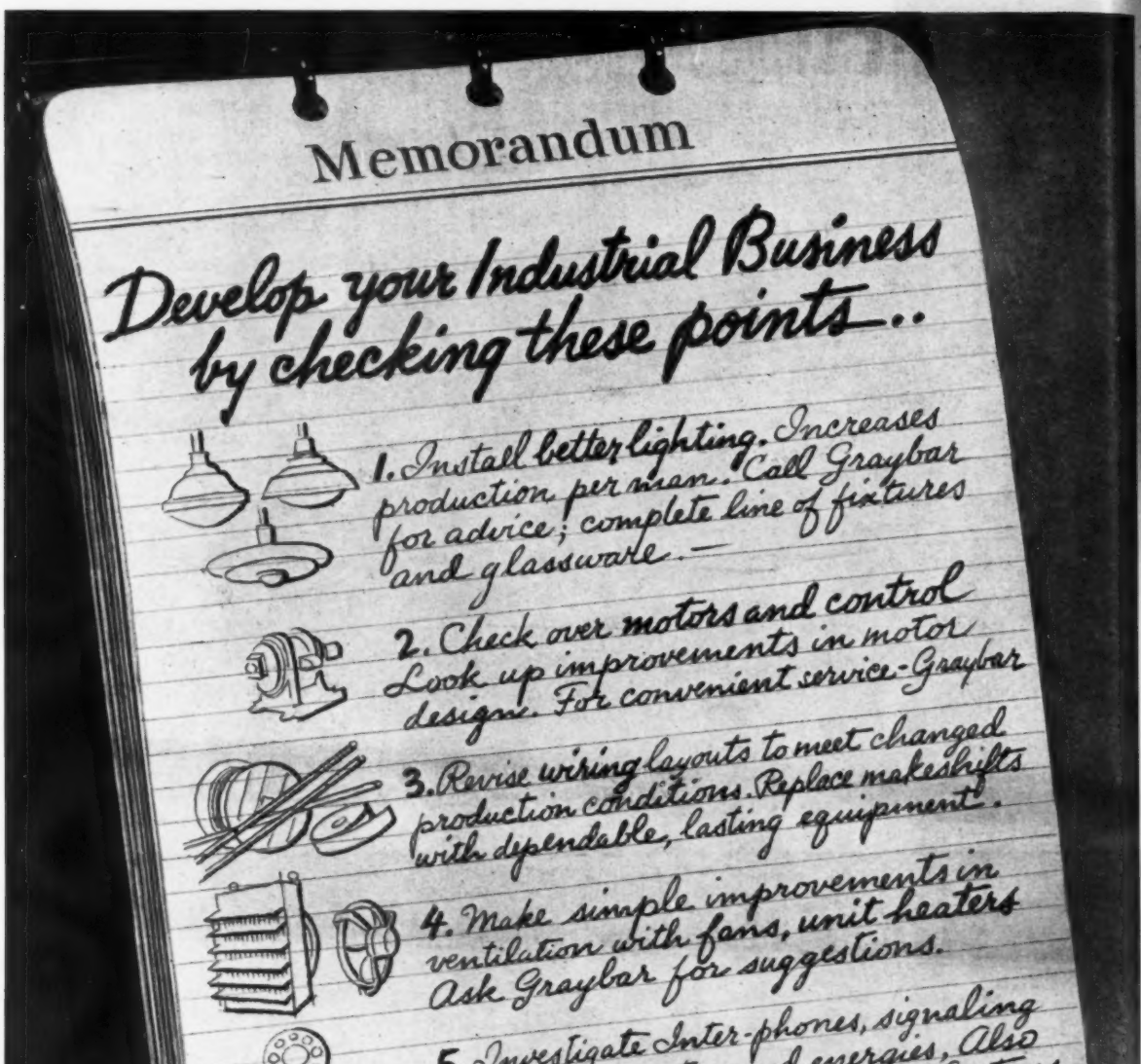
Memorandum
Develop your Industrial Business by checking these points..
1. Install better lighting. Increases production per man. Call Graybar for advice; complete line of fixtures and glassware.—
2. Check over motors and control. Look up improvements in motor design. For convenient service - Graybar
3. Revise wiring layouts to meet changed production conditions. Replace makeshifts with dependable, lasting equipment.
4. Make simple improvements in ventilation with fans, unit heaters. Ask Graybar for suggestions.
5. Investigate Inter-phones, signaling devices to save time and energies. Also investigate Western Electric Sound Systems
6. Check up on electrical tools for special uses. Good tools - Good workmen.
call on GraybaR — all electrical items. Offices in 79 principal cities. main office, Graybar Bldg. New York, N.Y.

BIG E.M.T. JOB—Chicago's Diversey housing project applied new methods of building construction, and these were matched with new wiring tricks worth studying.

WIRING
Geared to Building Methods

Chicago's Mammoth Federal Housing Project Called for Quick Roughing Operations Done on Short Notice

CONCRETE handling equipment, used in one of Chicago's housing projects speeded up slab pourings until but 1½ to 2 hours were allowed to rough in typical 30-ft. by 125-ft. areas. To meet this condition, the Wadeford Electric Company, of Chicago, in wiring some fourteen buildings for 250 family suites, resorted to pre-fabrication methods. Branch circuit raceways were bent on the ground, in advance of the installing crews. About 700,000 ft. of ½-, ¾- and 1-in. raceways were installed in concrete and partitions.

This, perhaps, is an example that presages still greater speed in modern housing construction. Some of the methods employed on this fast-moving project are worth studying.

This is one of the first large reinforced concrete projects to employ a tractor-mounted concrete derrick and aggregate was unloaded from trucks into hoisting buckets in 1-yard batches. These buckets were disgorged while suspended from the derricks boom, over various spots on the wood forms. When a yard of wet concrete was dumped, air-operated vibrators were used upon the forms and this jarring or tamping of the wooden forms set up strong high-frequency vibration that produced smoothly finished masonry.

Here then was more than a problem of quick roughing-in. Runs were required to be made mechanically secure to withstand concrete dumping in 1-yard batches, without becoming pulled out of alignment. Next, the coupled-up runs had to remain tight at outlets and at joined lengths against grout seepage, despite the vibration process used on the wood forms. Finally, there were numerous stubbed outlets and short runs that had to emerge from a 5-in. slab into exact alignment with 2-in. partitions.

Electrical metallic tubing was used throughout this project for raceways of 1-in. size and smaller. Work centers for bending crews were established between each pair of the fourteen housing units. Bending benches were arranged here to facilitate on-the-ground make-ready of pre-bent stubs for the floor slab that was next to be poured. Once a form was erected and the reinforcing steel in place the installing gangs were already equipped with the required pieces of bent tubing to fit all stubs at panels, switches, wall receptacles and inter-connecting points. The threadless coupling facilities, made available by the use of tubing, simplified the quick fill-in of straight-run lengths. After bent pieces were shoved into the drilled forms, the straight pieces were easily made up.

Such kicks and offsets, as were

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1. TWIN OUTLETS *called for two supporting brackets, just to make sure of exact positioning in the partitions.*

2. PANEL BOX *connections were stubbed long and sawed to final alignment by the box setting crews, to save roughing time, as no threading was needed on tubing.*

3. OUTLET SUPPORTING *brackets were insurance against misplacement of stubbed raceway, during the progress of concreting.*

4. FAST MAKEREADY of slabs was *accomplished because this mobile bucket boom outfit eliminated towers and sluice-ways.*

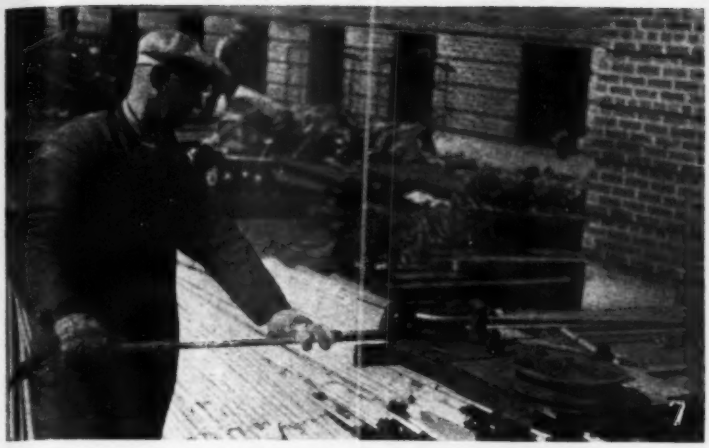
5. COUPLING UP *between bent sections went along speedily with the latest type of threadless couplings.*

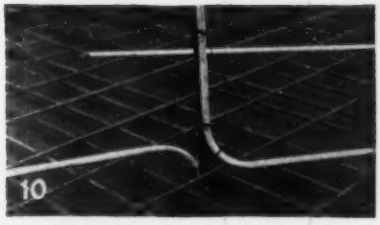
6. PATTERN BENDS *were made to uniform radius quickly and without fussing around to measure, because all operations were standardized.*

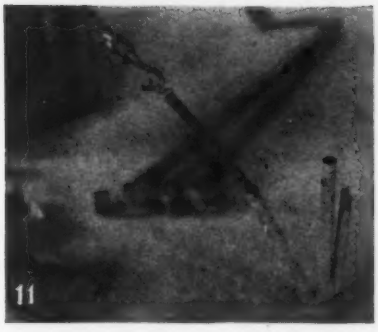
necessary to fit into the reinforcing networks, were made on the form. The last lengths required at outlet boxes or to join bent runs, were likewise cut to exact fit by the crews upon the form. Running threads are generally forbidden on this type of work, but the threadless couplings used with tubing required no extra assembly effort, and are reported to have satisfactorily withstood all the structural abuses.

To make stubbed outlets and horizontal runs of tubing behave atop the forms, this company used L-shaped supporting brackets made out of $\frac{1}{8}$-in. by $\frac{3}{4}$-in. channel iron. These brackets were nailed to the forms at each stub-up location. Runs of tubing were tied with stove wire to the vertical part of the bracket. The rough concrete floor revealed the upper ends of these supporting brackets projecting upward beside the tubing, thus serving as an auxiliary support until masonry partitions finally concealed the completed outlets.

One of the time-saving practices employed in this building was to generally disregard exact measurements at stubs. For instance, where four home







run tubes projected downward to a panelboard, the box-setting crews could cut off all stubs to exact height in less time than would have been required to originally rough in these stubs to the exact box level. The same general practice applied to general wall outlet work. Where possible, small pieces of surplus tubing were sawed off to height rather than to fill out short stubs with nipples. This also saved the expense of extra threadless couplings for the large number of outlets involved.

On-the-ground bending, as developed for this job, insured standard radii, and the bench-mounted roller bending equipment greatly simplified this work. The elimination of tube measuring, and the use of back-saving, waist-high leverage benders made it possible for the men to keep ahead of the roughing-in crews.

So with quick action demanded "on top", all went along without confusion, on a big job scattered over fourteen structures, because speedy wiring methods were developed. Planned methods and correct equipment were geared to the builder's technique.

7. PRE-BENT LENGTHS *of ½ to 1-in. tubing were made up on bench benders for the roughing crews "on top".*

8. CONNECTING TO OUTLETS *went smoothly, with only final kicks and offsets in straight lengths being made on top.*

9. WALL CONNECTING *crews used straight lengths of tubing and economized wherever possible on couplings.*

10. LONG STUBS *too were made to behave by cinching the sweep to L-shaped channel brackets.*

11. CRIMP PREVENTION *was devised by inserting correctly dimensioned coil springs in tubing, before kicking short stubs into "wandering" partitions. When bent as desired, a contracting twist of the coil spring freed it for easy withdrawal.*

12. BOX MAKEUP *before pouring was adopted on the last group of buildings. Stubs straddled the form bracket and tubing was cinched with stove wire.*

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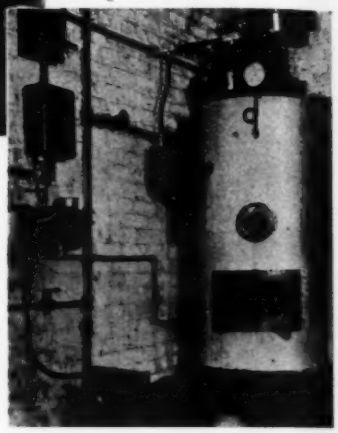
PRODUCTION METHODS (*left*) *for cleaning are becoming an important factor in modern shop practice.*

LIVE STEAM (*below*) *requires fuel and water, and automatic controls eliminate waste, delays and mishaps.*



Getting UNDER THE Scum

MOTORS do their work in many dirty places and seldom get washed behind the ears. When a breakdown occurs, the motor service shop often has a greasy mess on its hands. At the Armature Winding Company in Charlotte, N. C., dirty apparatus is cleaned up before it gets in everyone's hair. They do it with modern solvents under 80 lbs. hose pressure, and have their equipment specially designed to give quick, trouble-free production.

The biggest jobs, of course, are grease-caked motors of all sizes. Here equipment cleans the end frames, bases, bearing housings—right down to the raw metal. Stators are also cleaned with this same outfit after they have been stripped of burnt-out windings. Other messy cleaning jobs include transformer cases, reservoirs of oil circuit breakers, and large compensators.

The equipment used by this company consists of a 4 h.p., oil-fired steam boiler, a gravity-flow solvent tank, placed outside the building, and a system of inter-connecting pipes, hose connections and valves. Because of mild winters, all cleaning is done on an outdoor concrete platform the year round.

Live steam at 80 lbs. pressure is brought from the boiler in ¾-in. pipe and atomizes the mixture of solvent, as it flows through a ⅜-in. line from the elevated tank. The cleaning solution consists of 5 lbs. of solvent powder to a 55-gal. drum of water. A steam valve at the drum permits periodic mixing of the solvent. Hose connections for the atomizing gun or mixer are ¾-in. for the steam and ⅜-in. for the solvent line. These connections last for one year.

The gun mixes steam and solvent solution at the nozzle to give a uniform spray. This spray may be made wet or dry by adjusting the volume of flow of solvent solution from the tank to the gun. Under all ordinary conditions such an outfit operates with a flow of 1 or 2 quarts per minute. As the operator directs the spray against the various surfaces to be cleaned, it emulsifies oil and grease and removes dirt very quickly. The heat and steam pressure supplement the cleaning action of the solvent solution on heavy deposits of grease and dirt. The solutions used in this outfit are not inflammable, nor poisonous and do not give off fumes.

It takes only one man for the operation. Here are a few examples of cleaning time and cost—

	Approx. Time	Cost
5 h.p. 1200 rpm. motor....	.25 hr.	$ .22
20 h.p. 1200 rpm. "	.50 "	.43
50 h.p. 840 rpm. "	.75 "	.65
100 h.p. 840 rpm. "	1.50 "	1.29
150 h.p. 600 rpm. "	2.50 "	2.15
5 kva. transformer	.50 "	.43
10 kva. transformer	.65 "	.56
33⅓ kva. transformer	.75 "	.65
50 kva. transformer	.85 "	.73
200-amp. Oil circuit breaker.	.25 "	.22

A feature of this particular outfit is that the operator can shut off the flow of the solvent entirely and open a valve permitting clean water to mix with steam at the nozzle of the gun to give a clean, wet vapor spray. This is used for rinsing after cleaning operations.

To make this outfit work, there are full automatic controls, including high and low water cut-off, automatic pressure gauges, oil burner control and boiler feed pump control. The steel dutch oven, below the boiler has a molded fireproof lining built upon it to conserve fuel oil consumption. The outside of the boiler is insulated with an asbestos jacket. It is estimated that this 4-h.p. boiler condenses an average of 30 gal. of water per hour. This requires 3 gal. of fuel or furnace oil per hr. at a cost of 9½ cents per gal.

Tool Housekeeping Pays

NON-SKID—*No scarred conduit from dull jaws will come from this vise. New jaws and paint make a new vise.*

IN many shops the care of the tool stock is no more than a matter of getting the tools to the jobs as they are needed, and returning them to the shop. Their condition is left to the mechanic, who may use them. This is not so, however, with the J. Livingston Company, of New York City. This company has a lot of power and hand tools to look after and keep in service. So the tool housekeeping problem has been met with an eye to the investment these tools represent.

A small warehouse building is maintained, in charge of a man whose job is not only to distribute the tools to the foremen, as they are required, but to see that the tool stock is kept in first class condition, ready for any demands. An emergency job cannot wait for the repair of essential tools.

When a new tool is purchased, it is sent out to the warehouse. There it is recorded and all parts are carefully checked for lubrication. When tools are returned from completed jobs, they are thoroughly overhauled, cleaned, repaired and painted. Vise stands are tightened and new jaws installed. Reel jacks are oiled and painted. Pipe tools and machines are equipped with new dies and cutters. Portable drills and hammers are cleaned of grit and dirt and new brushes installed. All of this work is done before the tools are placed in the racks.

In this way, any tool going out from stock is known to be in perfect condition and ready for the job. This servicing program is justified in the economies realized by the greatly extended useful life of valuable tools and power equipment.

LIKE NEW: *(Above) Reel jacks need little care, but the mechanic who gets this one will find it in first class order.*

OVERHAUL: (*Right*) *This portable drill will be cleaned, painted and new brushes installed before the next job.*

Know Your Code—I.

THE AUTHOR: JOHN M. TURNBULL, *service engineer for the United Electric Company of Springfield, Mass., active in New England Code affairs, chairman of Article 210 Committee for the Eastern Section, I.A.E.I., formerly head of Article 9.*

Sweeping changes in arrangement will make the 1937 Code seem strange to you. These tables will help you find your way in it.

THE National Electrical Code, as rearranged in the 1937 Edition, presents a revision in language, form and order. What was formerly covered in 35 articles now appears in 10 chapters. Rules are placed in more logical sequence, inconsistencies are eliminated and its style is improved and unified. Contractors and other Code users will find little difficulty in becoming accustomed to this new arrangement. Fortunately no extensive changes were made in the rules, as may be seen from the accompanying list of principal changes or revisions.

It must be clearly borne in mind that while the Code has been rearranged editorially, and as to the sequence of its topics, this editorial revision has been checked and cross-checked under most exacting procedure, so as to avoid any changes in the actual requirements. Except for such new rules or changes as were adopted under regular code revision procedure, there should be no change in the substance of the 1935 Code rules.

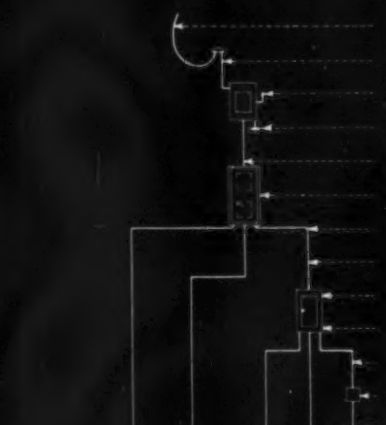
All of this painstaking work on the part of Code experts, dates back to a drafting committee of four, under the chairmanship of Victor H. Tousley, Electrical Field Engineer of the N.F.P. A., and secretary of the International Association of Electrical Inspectors. Then after more than two years of steady work the special committee of N.F.P.A., headed by Dr. M. G. Lloyd of the Bureau of Standards, received acceptance of this rearrangement as the basis for our 1937 Code rules.

In regrouping the 35 articles of the 1935 Code within the ten chapters of the 1937 Code, certain basic or fundamental objectives in Code making were adopted. An introduction outlines its purpose and scope, covers enforcement and interpretation, and the fundamentals for applying this Code to general practice. The first paragraphs of the rearranged articles present statements of the fundamental rules. Then follow detailed construction rules on methods to satisfy the fundamental rules.

Previous Codes contained within their various articles certain tables, diagrams, and manufacturing specifications or standards for devices or materials. As rearranged, two separate chapters now incorporate this material. Also, this Code explains for the first time that its standards are only minimum, and that larger sizes of wire, more circuits and better types of equipment will often be required to give satisfactory results. Other details of the principal Code changes will be presented next month.

THE CODE AT A GLANCE

A CROSS-INDEX CODE REFERENCE of twenty-two commonly encountered topics, keyed to a typical schematic system of interior wiring. For more special topics see Table of Contents Cross References.



	1937 CODE	1935 CODE
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Service Equipment	" 230	" 4
Grounding	" 250	" 9
Feeders	" 220; Ch.9	" 20
Switchboards	" 384	" 13
Wiring Methods	" 300 to 364	" 5
Conductors	" 300; Ch.9 and 10	" 6
Panelboards	" 384	" 13
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Art. 2.	General	Art. 110
Art. 3.	Outside Wiring	Art. 730
Art. 4.	Services	Art. 230
Art. 5.	Wiring Methods	Ch. 3
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	Section 508. Electrical Metallic Tubing	Art. 348
	Section 509. Cast-in-Place Raceways	Art. 330
	Section 510. Underplaster Extensions (Concealed)	Art. 358
	Section 511. Wireways	Art. 362
	Section 511. Busways	Art. 364
	Section 512. Installation of Boxes, Cabinets, Fittings, etc	Art. 370
	Section 513. Service Entrance Cable	Art. 338
	Section 514. Surface Wooden Raceways	Art. 326
	Section 515. Bare Bus-Bars and Risers	Art. 328
	Section 516. Non-Metallic Surface Extensions	Art. 342
	Section 517. Non-Metallic Wiring Systems	Art. 340
Art. 6.	Conductors	Art. 300, Ch. 9 and 10
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Art. 10.	Rotating Machinery and Control	Art. 430
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Art. 11.	Capacitors	Art. 460
Art. 12.	Switches	Art. 380
Art. 13.	Switchboards and Panelboards	Art. 384
Art. 14.	Fixtures, Lamp-Holding Devices, Plug Receptacles, etc	Art. 410
Art. 15.	Lamps	Art. 420
Art. 16.	Electrical Appliances	Art. 422
Art. 17.	Resistors and Reactors	Art. 470
Art. 18.	Storage Batteries	Art. 480
Art. 19.	Lightning Arresters	Art. 280
Art. 20.	Wiring Installation Design	Art. 200, 210, 220; Ch. 9
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Art. 35.	Motion Picture Projectors and Equipment	Art. 540
Art. 36.	Theatres, including Motion Picture Houses	Art. 520
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Art. 39.	Organs	Art. 650
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Art. 51.	X-Ray and High-Frequency Apparatus	Art. 660
Art. 60.	Signal Systems	Art. 800
	Tables and Diagrams and Dimensions	Ch. 9
	General Manufacturing Standards	Ch. 10

PRINCIPAL CODE CHANGES IN BRIEF

OUTLET GROUPING—Circuits determined by wattage load. (Sect. 2107.)

NUMBER OF RECEPTACLES—Definite spacings established for residence wiring. (Sect. 2110.)

WATTAGE RULES—New minimum watts-per-sq.-ft. rules for residences and commercial occupancies. (Sect. 2107.)

BRANCH CIRCUIT RATINGS—Classified according to ratings of fuses of circuit breakers. (Art. 210.)

RANGES—Grounding methods modified for use of flexible cord connections. (Sect. 2559.)

RANGE FEEDERS—Demand factors lowered for various groups or load combinations. (Chapter 9, Table 18.)

SERVICES—Omission of master service switch broadened in scope; also permit an additional service installation in single existing occupancies. (Art. 230.)

NON-TAMPERABLE FUSES—Permitted but not mandatory. (Sect. 2452.)

SWITCHES FOR HIGH-INRUSH LAMPS—Switches with "T" designation approved for full ampere rating. (Sect. 3814.)

EMERGENCY LIGHTING SYSTEMS—Not required for Small Theatres. (Sect. 5202.)

SERVICE CABLE—Types SE and ASE permitted for interior wiring, if rubber-covered types used. Sect. 3382.)

NON-METALLIC OUTLET BOXES—Will be approved for use with non-metallic wiring systems. (Sect. 3716.)

UMI

ATMOSPHERE THEATRE—*Pierce installed this "atmosphere illusion" lighting in the Chicago Theatre—It was a great success and has been copied far and wide.*

Looking in on Norman Pierce

By Earl Whitehorne

Third in a Series of Informal Visits to Interesting Contractors

IN the past thirty years, I have probably written a hundred of these little stories of men. They have all been interesting to study and to tell, because they are all different.

It must be so, for each man takes the cards life deals him. He doesn't try to be like anybody else. He is too busy being himself. And in his own way he evolves a career that is entirely distinct and individual, because his success is built up of this particular sequence of experiences and accomplishments—like no one else in the world. Norman Pierce of Chicago is a good example. He is the NECA Executive Committee man from Illinois, Indiana, Michigan and Wisconsin.

Pierce was born down in the Ozark Mountains of Missouri, where the hogs run wild and get so thin on acorns and steep grades, they cut fence rails as they go through. And so they call 'em "razor backs." Pierce got his soul steeped in that rugged fearless country before they took him to Chicago, at eleven years old. He went to school there awhile and, to help along, tended furnaces and worked in his father's grocery store.

He had a mechanical turn of mind and his brothers, Paul and Frank, were electricians. So at twelve Norman started fixing door bells, picking up odd jobs after school. The following year he was wiping engines. Then he shifted to a power house, working nights tending dynamos and school was over. But study had just started—through International Correspondence courses and in the celebrated college of Hard Knocks.

Wiring Railway Cars

From there he went romping on down the line of electrical progress. At fourteen he was hired by the Pullman Company. They had about a dozen Wood arc machines and a couple of Edisons. Pierce stayed there two years—with a six months interlude in a storage battery factory. The Pullman people had one steam man and one electric. At fifteen, Pierce was in charge of the electric end working at night. At sixteen he was set to wiring Pullman cars, day time. At eighteen they sent him to St. Paul to equip the coaches of the Northern Pacific Railway with electric lights. Fred Reed was in charge, with forty men, and they wired cars for a year. But before that time was up, they were working for the railroad itself.

Then came one of those experiences that turn corners in men's lives. Pierce went to the superintendent of motive power one day to get allocated to new work. He was told that the superintendent's son, just out of Boston Tech, would be in charge. This idea of promotion by influence instead of service hit Norman all wrong. He quit. Anyway he wanted to try out as many different kinds of wiring as he could find, so he spent four years or more working for Commonwealth Edison, Illinois Steel, the Chicago Stock Yards.

Well, the Pan American Exposition came along then—this was in 1901. Paul and Frank had both worked on the World's Columbian Exposition, in Chicago, in 1893. Norman thought he would give the new world's fair a whirl and went to Buffalo and they hired him for a power house job. But the union wouldn't let him in. So he worked around as helper for a few months and made two hundred dollars teaching other men to pass the union examinations.

He went home then and landed a job putting in a new plant and distribution system to light the University of Chicago. He got a gang together—students, anybody—and ran it through. On this job, Pierce made his first business deal. He bid against the junk dealers and bought the copper from the old plant and buildings. He had two thousand dollars saved up and borrowed another thousand from his family and

bought it. He then worked nights for months fixing it up. He cracked the insulation off the heavy weather-proof wire, instead of burning it, and got a better price and made a clean thousand on the turn.

He had about forty men working for him and when the job was done, the general contractor sent him and his crew to Bryn Mawr University near Philadelphia. But that didn't work out. They couldn't get along with the boss. There was lead cable to measure. Pierce asked for a steel tape. They gave him a cotton tape—ten feet too long—and charged it to him. The college girls were coming back and the men decided to live in Philadelphia, but the superintendent refused to pay car fare. So they all quit and the new gang they brought in burned up a building.

Warships for Variety

Then Pierce tried a new kind of wiring. Up in Bath, Maine, was an uncompleted naval coast defense vessel—the Idaho. She was a monitor—one of those "cheese box on a raft" affairs, flat with one round turret. She had been wired. The conductors were all pulled and the motors set but nothing was connected. A contractor in Philadelphia was to finish the job. He gave Pierce a rigid examination and sent him up to do the work. That problem made a jigsaw puzzle look like tit-tat-toe. But Norman sweated it out and stayed with the ship six months, through the trial trip, and the turret turned around and the guns worked—believe it or not—and Uncle Sam said "OK" and took her over. And it was no fault of Norman's that these monitors weren't worth a damn and wound up in the junk pile.

Pierce then returned to Chicago, joined the union, went to night school and for two years worked from job to job, so he could have time to study. During this period, he helped wire the Iroquois Theater, where some years ago they had the tragic fire. Then he stepped out and organized the Pierce Electric Company. He started with fifteen men and a capital of eight thousand dollars and discounted his first bill and has done so ever since. He began with small work, but gradually took on more complicated remodeling jobs. His brother Burgess joined him and they launched into factory and theatre work. Within two years they were doing an annual business of $100,000.

It was about then, he says that Ed. Lloyd, Vice President of Commonweath Edison sold him on the "back scratching theory". The industry was already operating on the basis of low competitive bids and taking profit out of "extras". Pierce was against it. He decided to become a factor in the sale of products and gain the cooperation of manufacturers and to give reliable service and win the confidence of customers. He has consistently followed that policy and for ten years has refused to work on per centage. It has paid.

He went into railway electrification and did the great Illinois Central job. He handled it all on contract—signals, interlocking switches, catenary, bonding—all of it. He did it with union men and beat the cost of the Virginian Railway, where they paid half the Chicago wages. He made a name by it.

He went into power house work then, handled the great State Line Station and at that time had five hundred men on the pay roll. He did the Michigan City Station and others—the complete installations—and that means a lot.

He developed better industrial lighting, in cooperation with Augustus Curtis, and worked out a scheme for theatre illumination. He finally got a theatre "built around a lighting idea"—the Capitol Theatre in Chicago—that has been copied all over the world. It is an "atmosphere illusion". The audience appears to be sitting outdoors surrounded by a city.

He is now doing the bridge on the Outer Drive in Chicago and has handled a lot more big work. He employs about fifty men and does one of the largest electrical contracting businesses in the middle west. Pierce knows the game. He has worked up from the bottom. And he is a salesman. He travels anywhere that a good contract offers. In his office is a special bag filled with photographic evidence of the work he has done—and can do.

But Norman Pierce does a lot more than run his business. He has been chairman of the Electrical Contractors Association of Chicago, and for twenty-five years on its Utility Committee, and for thirty years on its Labor Board.

(Continued on Page 29)

NORMAN PIERCE *is camera shy. But if you look quick, you will see him standing at the far left of this picture.*

ILLINOIS CENTRAL—*A glimpse at this big job of railway electrification, while Pierce's men were working on both bonds and catenary.*

Estimating Explosion-Proof Wiring—II

By Frank J. Seiler

Associate Editor, Electrical Contracting

The second article of a series covering the principal labor elements of wiring systems for hazardous locations.

FIXTURES AND FITTINGS *go up according to the complexity of the plant layout. Here is a most favorable example.*

IN an article in July, labor units were presented to cover general job costs, conduit work, elbows, terminals and unions.

But in the conduit take-off, the estimator will accumulate a list of fittings. These tables provide a conservative basis for estimating the further operation they involve for lighting, switch and receptacle outlets, junction and sealing points, and other purposes.

TABLE NO. 4—EXPLOSION-PROOF CONDUIT FITTINGS

Size Hub	Man-hours for Each Fitting: Single Hub	Two-Way	Three-Way	Four-Way
½-in.	.25	.37	.68	.97
¾-in.	.34	.60	1.0	1.3
1-in.	.5	.86	1.25	1.7
1¼-in.	.66	1.21	1.57	2.43
1½-in.	.96	1.6	2.35	3.25
2-in.	1.4	2.4	....	....
2½-in.	1.7	3.1	....	....
3-in.	2.1	3.7	....	....
3½-in.	2.5	4.2	....	....
4-in.	3.2	5.3	....	....

Note: Labor for expansion shields, drillings or other fastenings, caulking and sealing not included. Large switch or circuit breaker enclosures, special junction boxes, and other extra-size fittings not included.

Table 4 provides labor units for this general classification of fittings. It will be noted that larger enclosures are not to be figured from Table 4, and that separate labor allowances must be made for fastenings and drillings.

Because the labor costs for installing fittings vary according to the number of conduit hubs or entrances per fitting, Table 4 is arranged with columns for fittings of the one, two, three and four-hub types. The wiring layout should be made clear, to enable the listing of fittings in this manner for determining accurate labor costs.

After fittings are listed, the matter of fastenings and drillings for conduit,

TABLE NO. 5—DRILLINGS AND FASTENINGS FOR CONDUIT AND EXPLOSION-PROOF FITTINGS AND ENCLOSURES

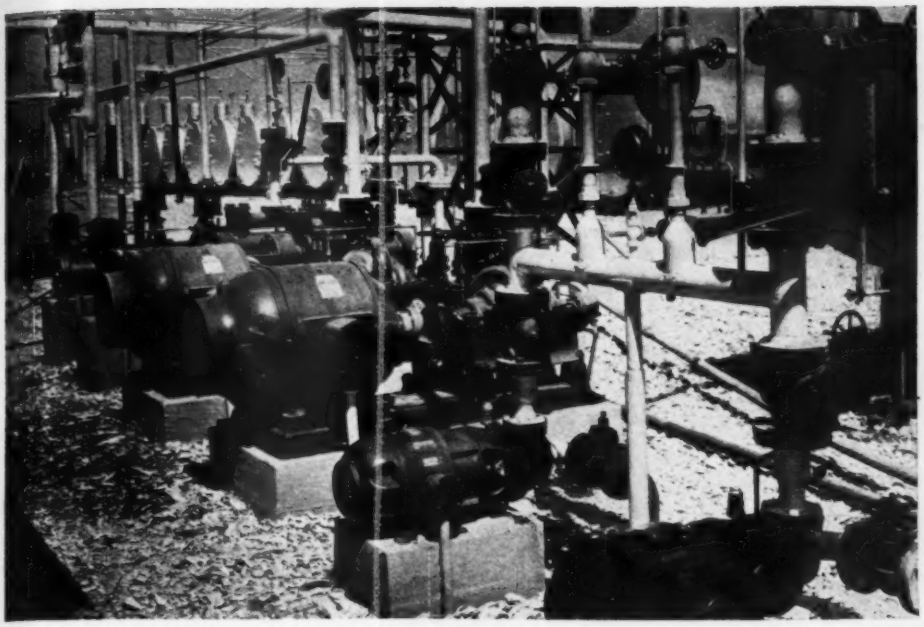
Man-hours per 100 units	Wood	Tile or Cinder Block	(A) Brick	(B) Concrete	(C) Holes in Steel
Wood Screw or ¼-in. hole	3.0	....	....	....	25.0
No. 8 Rawlplug	....	6.0	8.5	13.0	...
Lead Shield, 10/24 or ¼-20	....	....	10.0	16.0	33.0
⅜-in. shield or hole	....	....	12.0	20.0	38.0
½-in. or ⅝-in. shield or hole	....	....	17.0	24.0	42.0
¾-in. shield or hole	....	....	20.0	33.0	45.0
⅞-in. Togglebolt	....	24.0	....	....	....

Note: Column "A" — For Dense layouts using power drills, deduct 20%.
"B" — For Dense layouts using power drills, deduct 25%.
"C"-1 — For Dense layouts where punches may be employed, deduct 20%.
"C"-2 — For Dense layouts where Electric drills may be employed, deduct 25%.

TABLE NO. 6—WIRE AND CABLE PULLING FOR EXPLOSION-PROOF SYSTEMS

Man-hours per 1,000 ft. of wire	Length of Run: 50/75 ft.	76/200 ft.	201/1000 ft.
No. 14	8.3	....	....
12	10.0	9.25	....
10	12.4	11.1	10.0
8	14.8	13.8	11.2
6	18.6	16.0	14.8
4	21.8	19.0	16.8
2	26.3	22.8	20.0
1	29.1	27.6	23.9
0	31.6	30.3	28.1
00	34.9	41.0	31.6
000	42.0	46.8	36.2
0000	47.8	53.7	42.1
250,000 c.m.	53.2	60.0	45.3
300,000 c.m.	58.9	68.0	51.0
400,000 c.m.	68.9	80.3	58.9
500,000 c.m.	78.5	91.6	66.5
750,000 c.m.	106.0	124.0	90.7
1,000,000 c.m.	134.0	149.2	113.0

Note: For Single-Conductor lead-sheathed conductors, use units of next larger over-all diameter. For multi-conductor lead-sheathed cables, use unit for next smaller wire size, times number of wires involved.



LAYOUTS VARY, *as in this group of outdoor refinery pump motors. Some pipes were run underground, others overhead, strapped to various supporting mediums.*

COMBINATIONS *of installation methods for fitting assemblies involve all sorts of fastenings and interconnections which should be listed carefully, to obtain accurate estimates.*

fittings and various enclosures or equipment can be determined. Table 5 provides a variety of units covering fastenings to wood, masonry or steel. The units for steel are based on the average fastening holes at machines, columns and girders. Deductions from these units are reasonable, where a large number of drillings are to be made, with special teams working ahead of the installing crews.

Considerable difference of opinion is to be found among estimators, as to whether it should cost more to provide drillings and fastenings in hazardous locations. Higher than standard costs are given in Table 5, because more time is required to lay out supporting holes for a varying type of odd fittings than with conventional types. Furthermore, greater care is taken to obtain exact alignment of all runs. Where the structural surfaces are uneven, straps frequently require spacers or shims, to avoid springing conduit into place.

One industrial specialist points out that the cost of drillings and fastenings is especially high when spark-producing work must be done in explosive areas under operating conditions. So only after carefully analyzing unfavorable or risky conditions, can any fair estimate of cost be made.

Table 6 covers the cost to install wire and cable in conduit systems that are connected with all types of explosion-proof fittings. Units are arranged in three columns, for the estimator who prefers to figure wire according to lengths of runs that are to be pulled.

TABLE NO. 7—INSTALLING EXPLOSION-PROOF DEVICES AND FIXTURES

	Man-hours each
10 amp., S. P. Tumbler Switch & Cover, per gang	.5
3-Way Tumbler Switch & Cover, per gang	.7
10 amp. Polarized Interlocking Recept. & Nozzle	.7
25 amp. Polarized Interlocking Recept. & Nozzle	.85
50 amp. Polarized Interlocking Recept. & Nozzle	1.1
Flush Sealing Plate & Extension Nozzle	.25
Assemble 10 amp. Interlocking Plug, Cord and Hand Lamp	.75
Explosion-Proof Lighting Fixtures:	
Flush Type Pit Light, Body only	1.75
Flush Type Pit Light, Front & Sockets	1.0
60/100-watt Ceiling Fixtures, 12-ft. clg.	.85
60/100-watt Ceiling Fixtures, 13/20-ft. clg.	1.2
100/200-watt Stem Fixtures, 12-ft. clg.	1.35
100/200-watt Stem Fixtures, 13/20-ft. clg.	1.8
300/500-watt Stem Fixtures, 13/20-ft. clg.	2.3
300/500-watt Stem Fixtures, 21/40-ft. clg.	4.0
200/500-watt Intensifier Brackets	2.2
200/500-watt Floodlights	2.75
36-in. Flexible Conduit, ¾ to 1-in or shorter lengths	1.0
36-in. Flexible Conduit, 1¼ to 2-in.	1.3
36-in. Flexible Conduit, 2½ to 3-in.	1.5

It must be kept in mind that several factors affect wire and cable pulling costs adversely, in the average hazardous industry—

1. The fittings are usually so designed as to make pulling more difficult. Threaded covers and fastening lugs are encountered which must be avoided in wire pulling, to prevent injury to conductor insulation.

2. Because explosion-proof fittings are expensive, they are often used sparingly. This is especially true of pull or junction boxes that range in cost from $30 to $50 each. As a result, motor and feeder runs are often laid out that require more difficult pulling, but which in the end save some cost in fittings.

3. Explosion-proof wiring systems are usually associated with complex layouts of machinery, piping and varying floor elevations, all tending to slow up wire-pulling operations.

4. In addition to the conventional arrangement of outlets, there are many sealing fittings through which fish snakes must be guided or coaxed. These fittings often occur in out-of-the-way places, and add to pulling costs.

The devices and fixtures listed in Table 7 cover the principal items to be commonly encountered. While far from a complete list, an experienced estimator can use these items as a basis or guide for making equitable labor allowances for other items of a similar nature.

UMI

School Light UPPED

TEN TIMES

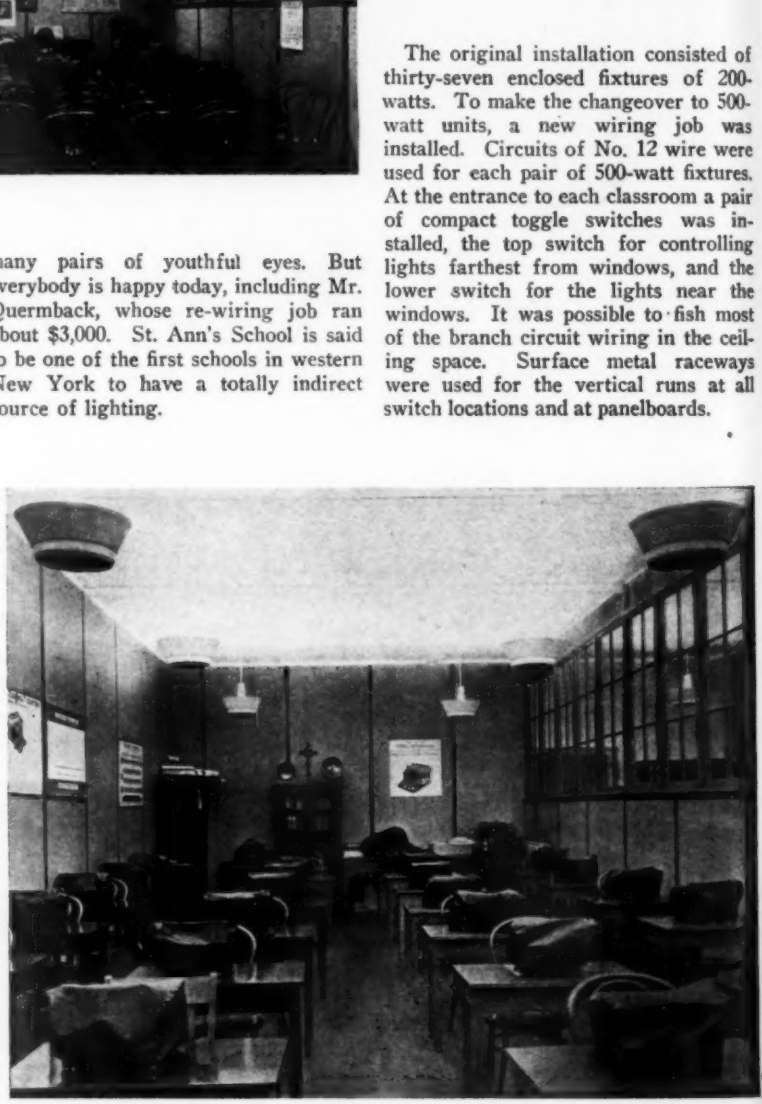
BEFORE:

GLARE VS. EDUCATION. *Eyestrain was severe in this class room until the human side of adequate lighting was sold.*

WHEN contractor and lighting engineer got on the job together, a Buffalo school relighted 25 class rooms. The lighting in **St. Ann's Parochial School, up there,** averaged only 1½ foot-candles until 105 indirect lighting units of 500-watts were recently put in its 25 class rooms. Now the readings run from 15 to 20 foot-candles—just ten times the amount of light provided before.

It all came about when Peter J. Quermback of Quermback Electric, Inc. cast his lot with the lighting engineers of his local power company. Both sold an idea that they were mutually agreed upon. They stressed the humanitarian side of adequate lighting as it affected many pairs of youthful eyes. But everybody is happy today, including Mr. Quermback, whose re-wiring job ran about $3,000. St. Ann's School is said to be one of the first schools in western New York to have a totally indirect source of lighting.

The original installation consisted of thirty-seven enclosed fixtures of 200-watts. To make the changeover to 500-watt units, a new wiring job was installed. Circuits of No. 12 wire were used for each pair of 500-watt fixtures. At the entrance to each classroom a pair of compact toggle switches was installed, the top switch for controlling lights farthest from windows, and the lower switch for the lights near the windows. It was possible to fish most of the branch circuit wiring in the ceiling space. Surface metal raceways were used for the vertical runs at all switch locations and at panelboards.



AFTER:

LIGHT HELPS LEARNING. *This completed installation of 500-watt indirect units provides ten times the former light and better quality.*

Selling By FIRST Impression

THIS APPEALING KITCHEN *makes sales, so here is where the bride, the home builder and the architect are taken.*

CUSTOMERS may come and go, but wherever they may wander after visiting the Barker Fowler Electric Company of Lansing, Mich., they have seen much to remember. This applies not only to the home appliance prospect. Those needing store, factory or home lighting, or out shopping for a motor, blower, tool grinder, carbon brushes or regular staples are also impressed.

In business for 25 years, this company ranks high throughout central Michigan in heavy construction work and operates a complete motor repair shop. The shop is quartered in a separate two-story building, behind the main structure. Offices are upstairs. Stock of all sorts is warehoused on all five floors, according to weight, bulk and order of turnover. Total floor area amounts to 17,000 sq.ft.

It takes eight men to run the motor shop. There are five girls and three men in the office, three stockroom and delivery clerks, two estimator-engineers, six appliance salesmen and from 25 to 150 wiremen. Wiring crews vary as the work fluctuates in big industries, like the auto plants.

But with all this diversity in operations, the company executives, W. F. Barker and B. C. Fowler, have never allowed pressure of business to interfere with one big objective. They make capital of that first impression.

(LEFT) HOME APPLIANCES *are sold in this up-to-date sales room. Air conditioned and indirectly lighted, with combination mercury vapor-incandescent units, this room is used once each month for a cooking school, for which about 125 persons usually turn out.* (RIGHT) SALESMEN'S BULLPEN—*Customers do peek in now and then, so desks and blackboard are arranged to give a good impression of modern methods and successful selling.*

THIS ROOM *is at the main entrance. Here counter trade, fixture seekers, wiring customers, and those with motor troubles are greeted, sold, or directed to the proper department.*

FOR THE MOTOR *or tool prospect, there are just enough items near the front entrance to catch the eye and stimulate desire.*

UMI

Since You Ask About the Gadget—

Here's

LAST April a new approach to the sale of more wiring to old houses was suggested in this paper. We recommended the use of a "gadget" that would show up low voltage—but not in volts. It would demonstrate to the customer how much his wires were over loaded and tight—how much the "pressure" is down.

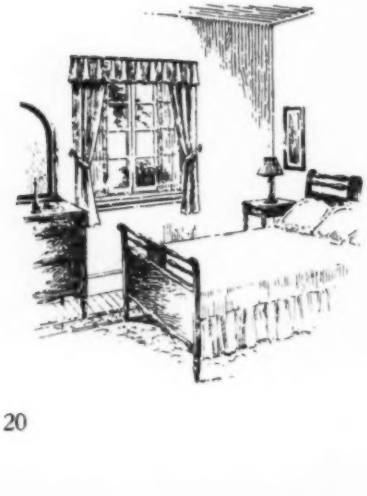
The idea was to provide a "gadget" that would help sell adequate, full comfort wiring, just as the sight meter has revolutionized the sale of better light. The idea has taken hold.

We are continually being asked—"What do the power companies think of the gadget approach?" Some are against it—a few—but we have received many letters about it from all over the country, and better than 80 per cent are for it. So because of the keen interest shown, we present the following comments—mere extracts from interesting letters—typical of the prevailing sentiment among the utilities.

1. *A North Carolina power company says,* "Lack of wiring is still the bottle neck of the industry and I hope that your revealing articles will help to correct this appalling situation."

2. *A California utility company says,* "I sincerely believe you have hit upon the right plan to attack this very serious problem, which has confronted us for years. Something new must be tried. The development of some kind of a gadget, as you suggest, and making an actual demonstration in the home should be very convincing to the owner."

3. *An Oregon power company says,* "You are on the right track. I am strong for your idea for an instrument on the order of a voltmeter, which does not read in volts, but reads in percentage of drop in voltage, which it would demonstrate. The industry faces a tremendous job in getting full comfort wiring in new premises and a larger and much more difficult problem if we try to rewire or add to the wiring of existing premises. We are extremely glad that you have undertaken to make an issue of it and to develop a "gadget" which will make demonstrations possible."



4. *A Washington power company says,* "As you say, the best way of making the buying public conscious of the need for this wiring is to use a "gadget" in the sales story on selling adequate wiring in existing homes. The real stumbling block in this problem is that of securing adequate financing for time payments to homes occupied by tenants."

5. *A Connecticut power company says,* "I have found much delight in reading over your interesting articles dealing with the deplorable conditions existing in connection with the house wiring problem. I thoroughly approve of the slant that you take on this subject."

6. *A New Jersey utility writes,* "I fully endorse the intensive efforts that are suggested in the articles. There is nothing more important in the upbuilding of the domestic business than the promotion of installations of adequate wiring in both new and old houses."

7. *Another California power company* says, "Perhaps your "gadget" plan is the answer. At least it will get everyone to thinking. Out of the whole discussion will undoubtedly, develop a workable plan. Your comparison of "full comfort wiring," as compared to "bare necessity wiring," was most enlightening. I want to compliment you on these splendid articles which are proving very stimulating to the entire industry."

8. *An Illinois power company says.* "You have done the whole industry a great service in these presentations, and they should contribute much toward getting really started on the wiring job. It is a pleasure indeed to know that you have taken it up in real earnest and are putting both analytical effort and life into it, which it has to have if the job is ever going to be done."

9. *Another California power company says,* "Obviously, the inadequate wiring of homes is a bottleneck to the sale of electric current and appliances. The proposal to "Get 'Em With Gadgets" is intensely interesting and a definite recommendation."

10. *An Ohio power company says,* "You are absolutely correct as regards the importance of improving the wiring of existing homes, particularly the matter of raising the standard of wiring in

What They Say!

new homes. The electric light and power industry is vitally interested and our company for one will be glad to cooperate in any plan which you devise."

11. *An Idaho power company says,* "The men particularly interested in this work are enthusiastic about your program; in fact we are just completing a separate department in our general sales office to handle a program of adequate wiring for new and remodeled homes."

12. *An Alabama power company says,* "I listened to your address in Atlanta. It made a great impression, not only because of its new and refreshing viewpoint, but also because it seemed to contain the essence of a very practical sales idea. Your article covered substantially the same ground."

13. *A New York power company says,* "Perhaps some sort of "gadget" is the answer to the situation. The matter of rewiring old homes has been a problem for years and the many attempts to solve the problem, have been only partially successful. I would be in favor of at least trying anything that seemed to have any symptom of merit and will look forward to the "gadget."

14. *Another Illinois power company says,* "From the point of view of this company, we heartily endorse your effort along these lines."

15. *A Missouri power company says,* "I think your gadget approach is excellent."

Manufacturers, wholesalers, contractors, leagues are all for it. Here's what a few of them say:

16. *A national manufacturer says,* "It is very timely and if we all get together and work with the enthusiasm that was shown at the meeting at Atlanta, it seems to me that you will have made a real contribution to the wiring situation throughout this country."

17. *A Pennsylvania manufacturer says,* "I desire to compliment you in tackling this proposition without fear. We pussy-footed around for many years without having nerve enough to do what you have done in your magazine. With this, we should be able to go ahead and make some progress. You have developed a starting point—we want to help."

18. *Another Pennsylvania manufacturer says,* "I frankly feel that you have hit on the best plan yet for getting better wiring into old houses and into new houses as well. I also like your term—'full comfort wiring'—instead of the hackneyed phrase—'adequate wiring'—which we have been using."

19. *An Ohio manufacturer says,* "I think you have a wonderful story and it is my own feeling that what you are doing along this line will be of tremendous benefit to the whole industry."

20. *A national wholesaler says,* "I think your approach to this wiring problem is both an interesting and intelligent one, and I hope it is as productive of results as it should be."

21. *An Eastern league says,* "I am very much enthused about your approach to "full comfort wiring." It certainly suggests a much improved procedure in this long discussed field."

22. *A western wholesaler says,* "The gadget idea is ideal. I hope that the same fine work can be carried on in this phase of our business as has been developed in the 'Better Light—Better Sight' movement."

23. *A Missouri league says* "Your idea of a way to sell house wiring by means of a 'gadget' is absolutely a classic. You have suggested something which I believe will revolutionize the method of trying to promote adequate wiring in the home."

24. *A contractor says,* "Your full comfort wiring publicity strikes to me—and others here that I have talked to—as a "knock out."

25. *A California league says,* "We think 'ya got something there' and hope that the instrument or gadget will soon be perfected."

There is another question too, that we are being asked from all sides—"How is the gadget coming along?" And the answer to that is no less definite.

Three manufacturers are working on the gadget right now. Tests have been made. Models are being developed. Before long it will be ready—and we will present it in these pages.

Old Hotel

1

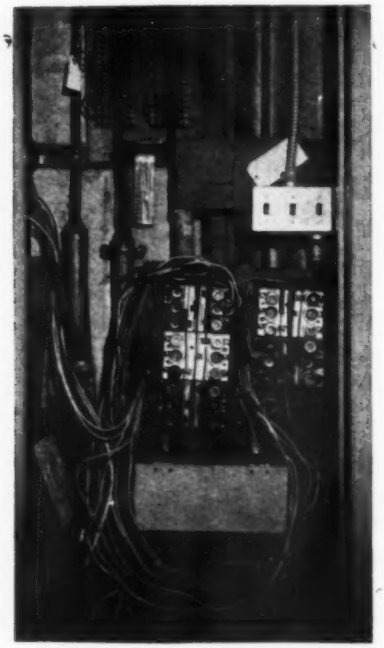
Built 35 years ago, a Cleve[land] Hotel [Re]

WHEN Cleveland's Colonial Hotel was built in 1901 it was rated among the best in town. But a span of 35 years had outmoded its guest conveniences. To compete with the modern comforts of new hotels required modernization. So the electrical system of this hotel is gradually undergoing a complete change, while new elevators, plumbing and other work is being put in.

At a cost of about $125 per room the Colonial Electric Company is installing new wiring and fixtures. This is being done five or six rooms at a time, in cooperation with other trades, to avoid closing the hotel.

3

5



BEFORE

1. *Outmoded Bathrooms—While guests of earlier days may have been quite at home here, 1937 guests want more for their money.*

3. *The Old—Guest rooms like this were modernized, completely re-wired and properly lighted, with business as usual in other parts of the hotel.*

5. *Branch Circuits—Each room is on its own circuit, with all old wiring and feeders replaced. Larger panels will replace these extra temporary fuse blocks.*

UMI

2

YOUNG AGAIN

tel Re-wires to 1937 standards

4

IN contrast with old-time rotary snap switches, obsolete lighting, and a lack of convenience outlets, the new layout provides four plug outlets for each room, modern wiring devices and lighting fixtures, and entirely new feeders and branch circuits. The 35-year-old conductor insulation was no longer suitable, nor was the copper adequate to serve the load. Each of the 150 rooms is now being placed on a separate branch circuit, which means that the panelboards have to be doubled in size over the original installation. Similar improvements had to be made in various dining rooms, corridors and service areas to make a 1901 electrical system serve the needs of a 1937 travelling public.

6

AFTER

2. ***Made Over—What had been an antiquated bathroom now gleams anew with see-able lighting. A switch at the door controls a wired medicine cabinet.***

4. ***The New—Redecorated and furnished, with four convenience outlets, new wiring devices and fixtures, and the system recircuited throughout.***

6. ***Handy Control—At room entrances compact triple-device outlets combine two toggle switches, and a receptacle for the cleaner.***

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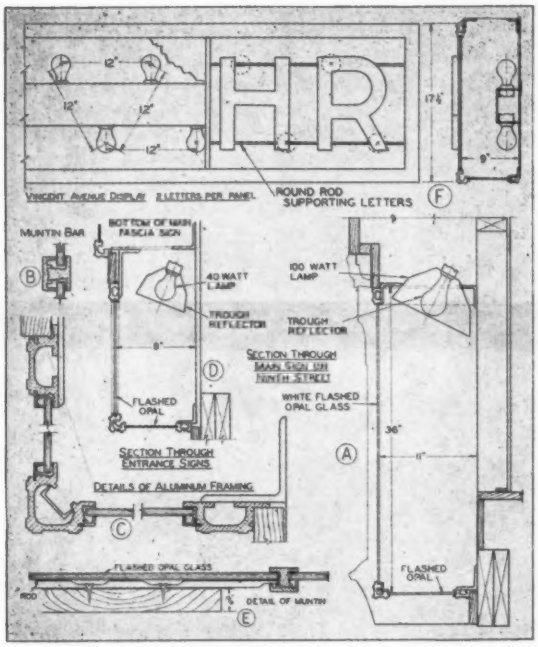
Luminous Advertising

Interesting Example of Graduated Brilliance in a Building Front

GRADUATED BRIGHTNESS—*In this luminous front the brilliance the light is graduated from the top down to give an unusual ef*



CONSTRUCTION DETAILS—*How the Fisher Rohr restaurant display front was installed*

By G. R. LaWall

General Electric Company Nela Park Engineering Dept., Cleveland, Ohio

WHILE uniform brightness seems most often to be favored for luminous displays, there are many places where a graduated brightness may be made more interesting—at least it will afford some variety. Sometimes the graduation is dictated by space, in depth limitations for placement of the light sources. Or, the proportions of the luminous element may be such as to make lighting from behind one edge appreciably more economical.

In the luminous treatment of a Cleveland restaurant, both uniform and graduated brightness was used. Proportions of the main display on Ninth Street led to the use of lighting, shading downward from the top. With proportions more favorable to uniform lighting, the Vincent Avenue entrance was given a uniform brightness.

Removable panels at the back permit access for maintenance from within. White flashed-opal glass is held by a new method of framing, composed of special extruded aluminum members. Details are shown in the drawing.

Letters of wood with flat black faces are supported by two round quarter-inch aluminum rods suspended horizontally between muntins. The large letters are 24 inches high and 13/16 inches thick. Form and finish of the rods is such as to present two unobtrusive lines extending the full length of the display as part of the background pattern. It should be noted that separate panels of glass are regulated in size for balance with individual letters and for appropriate spacing between characters.

In the main display, the large sign panel is 35 feet 8½ inches long, 3 feet wide and 11 inches deep. White flashed-opal glass is used for the face and the luminous soffit. The sign is lighted by thirty-four 100-watt lamps at 9 inch spacing, in a continuous white trough reflector. The brightness of the element is 175 footlamberts at the top and 24 footlamberts at the bottom. (A surface which reflects or transmits light at the rate of one lumen per square foot has a brightness of 1 footlambert.)

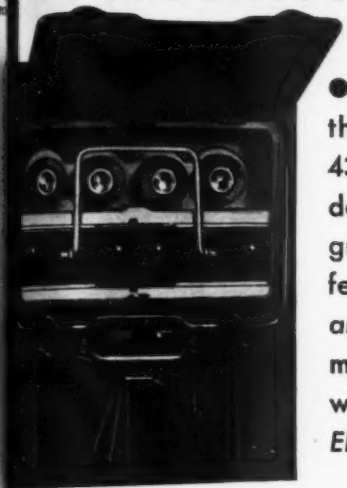
In the Vincent Avenue display, the sign pane is 16½ feet long, 2 feet wide and 9 inches deep. Here also white flashed opal glass is used for face and soffit. The sign is lighted by two rows of 40-watt lamps, staggered on 12 inch centers. The brightness of the element is 40 footlamberts.

The doorway signs include a luminous soffit. They are 65 inches long, 17½ inches wide and 9 inches in depth. Each employs one row of 40-watt lamps on 9 inch centers. The brightness of the elements is 85 footlamberts.

Sure to be Most Widely Used Service Switch in America!"

CONSENSUS OF POWER COMPANY OPINIONS

New C-H Construction Eliminates Main Fuses; Offers Score of New Features



● By unique simplified design, this new switch (C-H Bul. 4334H17) offers features of tremendous appeal to everyone interested in domestic entrance service equipment. Power company officials call it the greatest advance ever made. Contractors hail the outstanding installation features it offers. The public will applaud this as the first entrance switch *anyone* can understand and use without fear or hesitation. Check over the many features of this new switch and make sure you quickly capitalize what it has to offer. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1306 St. Paul Avenue, Milwaukee, Wisconsin.

VERSAL MOUNTING

be installed in normal or inverted po-. Either way, door over fuses stays open ed as desired. "ON" and "OFF" in- on reads correctly in either position

NO MAIN FUSES

Modern unit construction avoids double fusing. Eliminating main fuses drastically cuts needless service calls, avoids principal source of internal heating, permits compact design.

UNCONCEALED MAIN SWITCH

Toggle type main switch operated from outside of case familiar to public and used without fear. Saves needless service calls for simple branch circuit fuse replacements.

SILVER-TO-SILVER CONTACTS

Genuine silver-to-silver contacts used on main switch to insure easy operation and current-carrying efficiency despite infrequent use. Silver contacts never corrode or stick.

DOOR AND COVER SEALING

Both cover of the case and door over fuses may be sealed with standard meter sealing devices if desired. Provision made for testing both range and branch circuits without interruption to service.

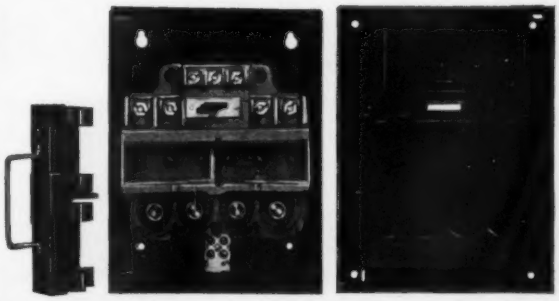
MODERN STYLING . . . MAR-PROOF

Attractive appearance whether flush or surface mounted. Black finish of case is mar-proof and scratch-proof, especially selected to take easily (and hold without chipping, cracking or scaling) any interior finish used in home decoration.

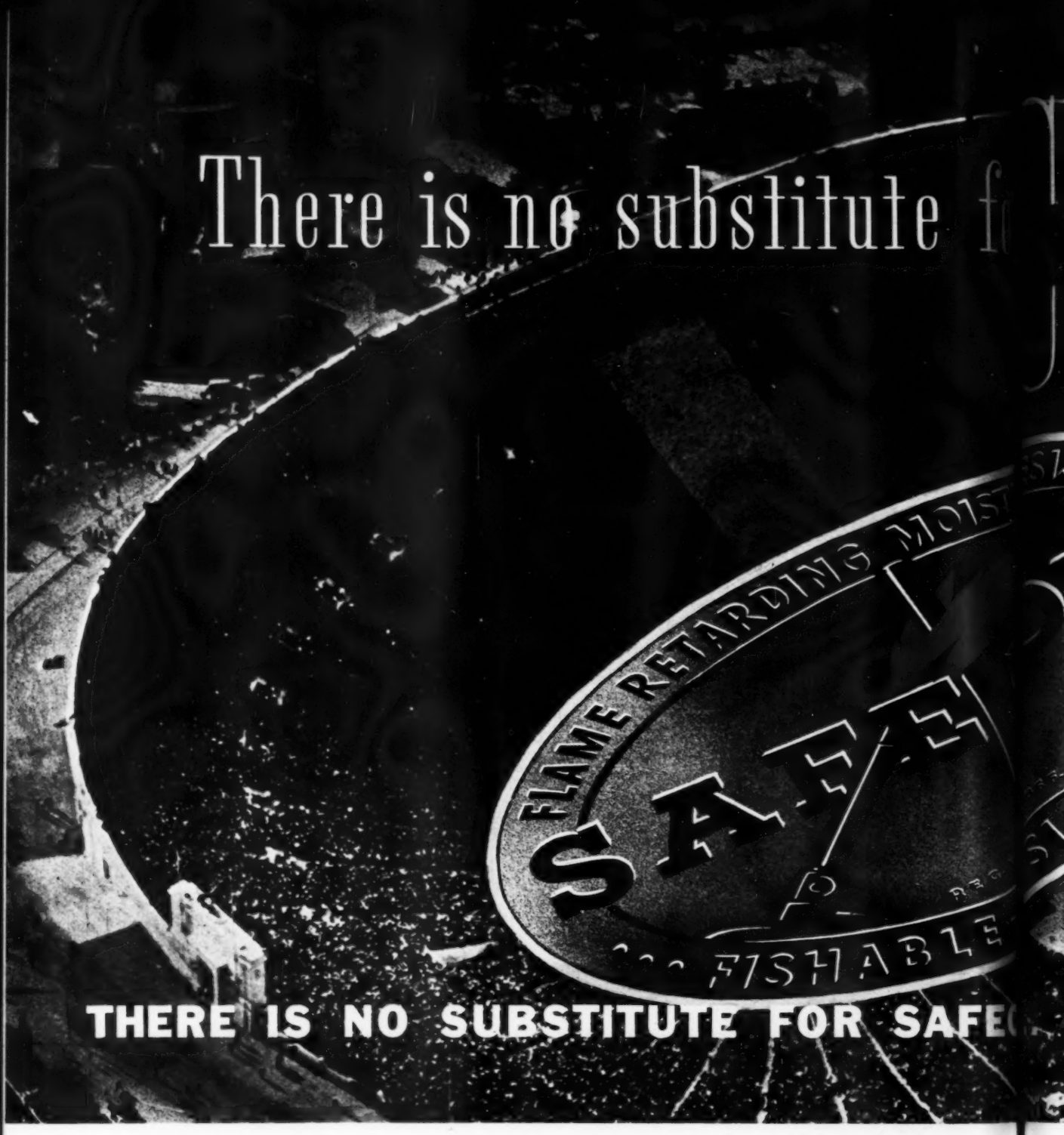
INSTALLED EASILY AND QUICKLY

As shown below, cover of case is easily removed for wiring. (Range fuse pull-out has been removed in this view to merely show construction.) Between all terminals are solid porcelain insulating barriers.

Solderless connectors are used throughout which operate either with screw driver or ¾-inch socket wrench. Branch circuit terminals are equipped with new C-H patented easy-tite wire holder.



UTLER-HAMMER C-H SERVICE SWITCHES



TODAY, the attention of the electrical industry is on Safecote... the best known name among electrical conductors. Today, architects, engineers and builders are specifying Safecote...

Because... Safecote electricial conductors are dependable, economical and SAFE... they are made to exacting standards... under the s[illegible]he Sa

Moisture Resisti[illegible]lly

destructive agents [illegible]ght a[illegible]

Flame Retarding[illegible]ry fl[illegible]

Fishable, Slick F[illegible]o pul[illegible]

More wire possible[illegible]e con[illegible]

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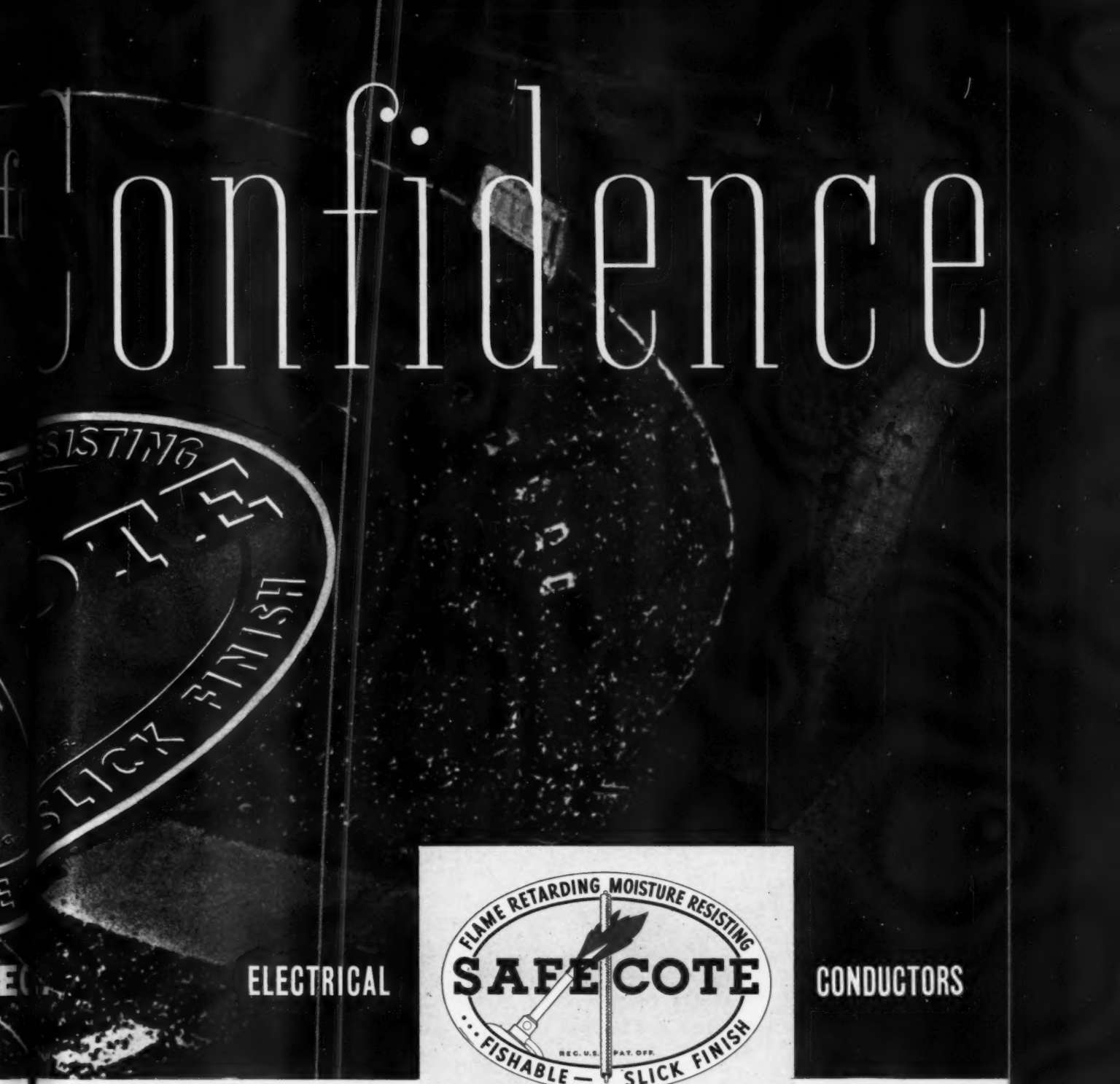

FLAME RETARDING MOISTURE RESISTING

SAFECOTE

FISHABLE — SLICK FINISH

REG. U.S. PAT. OFF.

U. S. LETTERS PATENT NUMBERS:

1,635,829	1,772,436	1,765,000
1,798,486	1,410,790	1,536,549

OTHER PATENTS PENDING

INSIST UPON GENUINE SAFECOTE FOR YOUR PROTECTION

Safecote laboratories:

lly sealed against such

ht and air.

ry flame.

o pull through conduits.

e conduit.

SAFECOTE LABORATORIES ARE AT YOUR DISPOSAL

SAFECOTE PERFORMANCE SPECIFICATIONS UPON REQUEST

GEORGE C. RICHARDS, LICENSOR'S AGENT
155 EAST 44th STREET, NEW YORK CITY

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HAZARD
ARMORED CABLE
SAFE *and* CONVENIENT

SAFE because of the high quality of the HAZACODE rubber insulated conductors; the moisture resisting, flame-retarding finish of the braids; and the moisture and flame-proof wrapping enclosing the conductors.

CONVENIENT because the quick strip feature saves time for the wireman. One tug and the paper is off! And the rubber insulation strips easily, leaving the conductor clean and bright.

Your request will bring samples and literature.

The bushing has the distinctive projection which holds it firmly in place and prevents the cut edge of the steel from injuring the insulated conductors.

HAZARD INSULATED WIRE WORKS

Division of The Okonite Company — **Works: Wilkes-Barre, Pennsylvania**

Sales — New York, Chicago, Philadelphia, Atlanta, Seattle, Dallas, St. Louis

Offices: Pittsburgh, Buffalo, Boston, Detroit, San Francisco, Los Angeles, Washington

Looking in on Norman Pierce

[FROM PAGE 15]

He has been very influential in labor relations in the mid-west. He gives an amazing amount of time to industry problems and affairs. He is so organized that he can do it.

But Pierce works in his own way. He is extremely modest. He has an appearance of simplicity in taste and interest, but he is a deep student of human relations and industrial conditions. He likes to watch the wheels go round, to observe men and affairs. Behind the scenes, he likes to try to keep things steady, to keep men satisfied, to spread a little oil and keep down friction. Most of it is not seen, not appreciated, but every once in a while it comes to the top and registers. Pierce won't talk about it. But that's what I get from those who know him.

Pierce likes people. He is generous, fair minded, holds no grudges, will go out of his way to do a favor, stands by his industry even if it means sacrificing himself. Also, he knows what is going on—and usually what it means—and that's a lot.

He is a great home man, has a fine family and lives in Western Springs, Ill. He also has a place at Stone Lake, Wisconsin, where he has been doing battle with the ice as to whether or not his concrete pier is going to stay where he put it. And I'm betting on Norman. He has been a leader in local civic affairs, one of the town fathers.

But beyond all else. Pierce has his heart set on helping stiffen the back of this contracting industry on its competitive policy. He wants to see men set a fair price on their work and make a profit by good selling and good management and not from extras. And in this everybody should be with him.

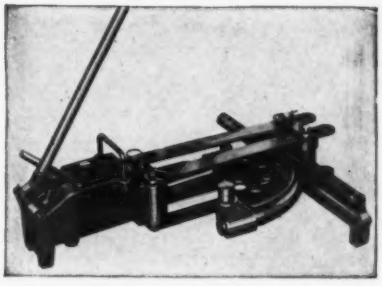
"An' I sez to him— 'Looka here, Boss!'—!"

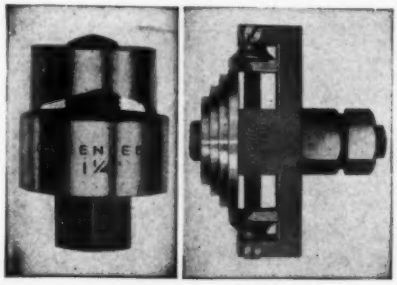
Use GREENLEE TOOLS FOR Better Wiring Jobs and Greater Profits

On jobs where Greenlee Tools are used, contractors not only are able to do better work, but many operations can be performed faster and with less effort on the part of the workmen. This makes it easier to realize a profit, something that can't be overlooked in any business. So evident is this in bending conduit and enlarging knockouts that many have reported to us that these tools paid for themselves on the very first job.

Hydraulic Benders

Above is the Rigid Conduit Bender in action. It is readily portable and simple to operate. Bends made with it are smooth and accurate, with very little distortion in the metal. No. 770 bends all sizes from 1¼ to 3". The large bender, No. 775, handles all sizes from 2½ to 4½". The No. 770-T Thin-Wall Steel Conduit Bender is shown to the right. Same as No. 770 but with attachments for bending 1¼, 1½ and 2-inch thin-wall conduit.





Knockout Tools

Greenlee Knockout Punches and Cutters are labor-saving devices to a much greater extent than their simple appearance would indicate. They eliminate all reaming and filing in the enlargement of holes for conduit in switch boxes, etc., and they perform the operation in a fraction of the time required by other methods. Punches come in two sets for conduit from ½ to 2-inch. The cutter is for all sizes from 1½ to 3-inch.

GREENLEE TOOL CO., Rockford, Illinois

Mail This Coupon To-day

GREENLEE TOOL CO., ROCKFORD, ILL.
Please send information on the following tools:

☐ Rigid Conduit Benders ☐ Thin-Wall Conduit Benders ☐ Pipe Pushers
☐ Knockout Tools ☐ Joist Borers ☐ Electricians' Bits ☐ Bit Extensions

Name ..... *Address* .....

City ..... *State* .....

My Jobber is *9-37*

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Editorials

Earl Whitehorne, Editor

The Trouble With Us

People say—"What is the matter with the contracting business?"—meaning house wiring and small work. It is an important consideration because it involves so many men, so many jobs, so many places.

The thing they are concerned over is that small wiring today is flat on the ground and has been for a long time. Price competition has laid it low and much of the work is being done for about labor and material cost and sometimes less—with the hope of profit on extras. Contractors with shops and offices have quit talking quality, service and responsibility and surrendered this large volume to the lads with step ladders and ten dollars worth of tools. The result is poorly wired under-wired houses, and small appreciation among builders of what good wiring is worth, for security and to help sell houses. And the whole electrical industry is suffering as a result.

But it is not hopeless. There are two things—three things to be done. The contractors themselves can straighten the situation out and put themselves back on their feet, as soon as they want to.

First—They can face the facts and reform cooperatively in any community. That means—

a. A strong well financed local organization
b. Sound local cost standards
c. Education in costs for the small contractor
d. Strict—but voluntary—enforcement of these cost standards.

Second—Once they know their costs, these contractors can sell wiring at fair profits, if they will mix ideas with it that make it worth more to the customer. They can lift wiring above the price plane by creative selling.

And when this happens—then the third thing—They can secure the support of the other branches of the electrical industry on a new basis—an enthusiastic promotion of wiring to the American people in a way that will produce a volume of this business beyond the present dreams of any contractor.

With some ten million houses needing more wiring—this can be done, as soon as contractors are ready to produce wiring in large volume, with good quality, fair prices and fair profit. For these good things all go together.

The point is then that nobody is going to change the world for the contractor. He makes his world and he can change it himself. And everybody knows it ought to be changed and wonders why he doesn't do it. The smart contractors in every town can start the cure today, if they want to take up the white man's burden and start some self government.

Paging Mister Business Man

Opportunity has a way of sneaking upon people without making much noise. It's a sly trick—but not a bad one for the chap who keeps his eyes open.

For example—The sale of small mechanical stokers has been doubling every year of late and in 1936 some 78,110 of them were sold—mainly for domestic use. Well, a stoker has a motor on it and it requires control. That calls for wiring. And a word to the wise starts something.

Roosevelt apparently has not put any law through that an electrical contractor cannot sell these stokers, if he wants to. Surely there is no constitutional barrier to his telling people about them and getting a job to hook them up—and in the process making some money. And it is the kind of a new idea that interests people and sells easily.

In a way it's like the attic fan—a lot of them were sold last year—nobody knows how many—and this summer they are going like popsickles in purgatory. They have to be wired too. Of course, any contractor knows that he can sell a fan—and how about a thousand of them around town? It's being done.

Perhaps hustling after good things like this is something of a nuisance. But, after all, the spending of the profits is a lot of fun.

Mr. Co-op, Electrical Contractor

Farm cooperatives, in some parts of the Middle West are taking over the job of wiring their own farms. The practice is to give young farmers two weeks' training as wiremen and send them out with materials furnished to the farmer at wholesale prices. An inspector checks over the job and everybody is happy.

But—after all a cooperative is just a business organization. It may distribute profits over a large group, or

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operate without profit. Still, Old Man Overhead carries on, regardless of what the business may be. He demands cash on the line in the farm bureau store or the electrical contractor's shop with equal ferocity. And it is extremely unlikely that the inexperienced cooperative will be able to keep its cost of sales down to that of an established contractor.

In the second pace the electrician's trade is a skilled craft. If boys can be trained to do electrical work in two weeks, our industry has been operating under an expensive delusion. Or if, for some strange reason, the skill required for farm wiring needs little training, we should have special short-trained wiremen for this work.

No matter what happens, it is hardly likely the cooperative will be able to do anything about labor that could not be done better by the contractor. It all boils down to a question of whether the farmer can handle an electrical contracting business more efficiently and profitably than we can. Or maybe we should try farming.

The Britons Have A Law for It

Our Uncle Samuel is comparatively young in the art of governing. John Bull has had more experience. So he has set up self-government within industries and it works. We tried to under NRA and it didn't work. But under British law the electrical industry has a "Fair Trading Policy". Its purpose is—

> "The regulation of business between all sections of the electrical industry, so that the function of each is defined and each receives the fair reward of his labor to the end that fair dealing prevail, the public be well served and the cause of electricity advanced."

Under this law and by agreement in the industry they set up standard discounts—

> "So that users obtain supplies at reasonable prices, distributors shall be adequately remunerated for their services and manufacturers make a reasonable profit to enable them to pay reasonable wages and so avoid labor disputes and at the same time provide for research, standardization and development work."

Under this policy the same discount is given to power companies, contractors, retailers and special large buyers, who to qualify must permanently employ "a staff of electricians, not less than one supervising electrical engineer and two journeymen." They also extend a lesser discount to a "recognized user", who must be listed on the "Electrical Register" or permanently employ one or more journeymen electricians. When the trade receives 33⅓ per cent discount he gets 25, or where it is 25 per cent to the trade it is 10 to him, and where the trade receives 10 per cent, he pays list. Manufacturers and wholesalers sell only to purchasers entitled to discounts. Supporters of this policy are free to trade only with those who conform to these principles.

This "Fair Trading Policy" brings orders into the electrical business in Great Britain. It injures no one. It insures that good management can enjoy prosperity in any branch of the industry in good times. It is so sensible that even though we have no law, the members of our industry in every trading area should cooperatively conform to these same basic principles of fair dealing. And some day, God willing, our Uncle Samuel will grow up and we, the electrical trade here, can frankly and openly govern ourselves.

Two Traditions Worth Killing

If the power companies want to reduce the cost of wiring and would like to make a contribution toward it, here are two expensive traditions that might well be laid away in lavender—

1. When there are ten factories in a city block the utility runs ten services, as a matter of course and reads ten meters. But when a single factory covers that area, it runs one service and the interior wiring all radiates from that point. Now, in a big factory or department store or apartment house, that stretches round a block, why not provide two or maybe four services and read four meters and consolidate the bills? It will cut the cost of wiring and with good selling, that money might be applied to other applications of electricity.
2. The utility runs its secondaries horizontally past a large apartment house; why not vertically? If secondaries were run up the outer wall of the building, along the vertical line of kitchens, electric range customers could be connected, every ten or twelve feet. It would then cost them, say, fifteen dollars to hook up a range, by drilling the wall and running a few feet of cable, instead of having to extend a line twenty stories up from the basement, with a bill of $180. Or is it $280—depending on the city and the building? It would mean setting a meter in a partition between that apartment and the public corridor, but it would sell ranges.

While we are making our methods modern, let's look the cost of wiring all the way through. Let's see where outworn tradition is making it expensive for the customer. Then let's change it.

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WIRING Methods

CABLES ON TREES

So many fireproofed feeder cables were used that supporting trees were necessary to keep them properly separated at the Cathedral of Learning job at Pittsburgh. With a main switchboard pullbox measuring 52 ft. long, 6 ft. high, and 6 ft. deep, the Iron City Engineering Company had the cables routed to leave plenty of working space, to facilitate any cable changes later on.

To provide space in this box for the cables to be kept intact as to runs or phase groups, a framework of horizontal steel channels was built in. The webs of these channels were faced downward and slabs of insulation material were fastened upon the flat shelf of each member. Below these horizontal members were rows of vertical free-standing channels fitted with cable racks. These cable trees permitted grouped cables to be arranged in tiers or rows, which left work aisles within the pull box length, for mechanics to walk, wherever future changes may become necessary.

The switchboard for this 42-story structure comprises 17 panels and is 47 feet long. At the lower right may be seen the operating mechanism of a 1600-amp. remote controlled air circuit breaker to which high-riser feeders are connected.

CABLE AISLES—Large feeder network in main pullbox arranged to leave work aisles for future maintenance.

SPYING-OUT HIDDEN OBSTRUCTIONS

Fishing armored cable under old floors works fairly well when the coast is clear. But sometime it is not. To find out what obstructs the fish tape, without taking up extra flooring, try a small mirror and a flashlight.

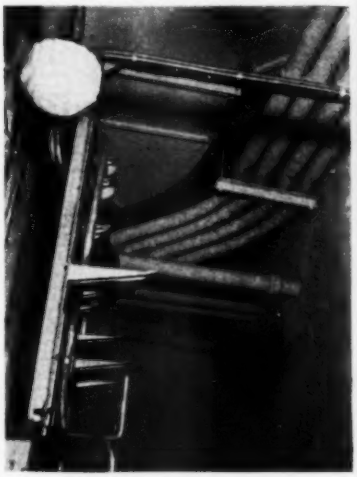
Here we see a re-wiring job under way in a Cleveland hotel in which the Colonial Electric Company's men ran into many obstructions. After pockets were made in the floor a small mirror was held at an angle facing across the room and the flashlight was directed back between the floor joists. The mirror revealed underfloor conditions all the way across the room.

CONTRACTORS' PERESCOPE — A mirror placed in the floor opening throws the flashlight's beam into the underfloor space.

ADEQUATE TELEGRAPH SERVICE

A lot of stock brokers can be served with the telegraph circuits it is possible to pull through these four 3½-in. service conduits. They connect with Toronto's new ½-million dollar Stock Exchange building.

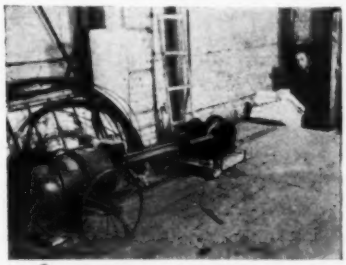
From a main pull box located behind these rugged telephone cable terminal racks, in the left foreground the Canadian Comstock Company, Ltd., brought these conduits on trapeze hangers, with some impressive off-sets, to a large terminal cabinet located in an adjoining room. Inter-connections of the telegraph circuits, in the exchange proper, are under the supervision of Canadian National Telegraphs.



BUSY RACEWAYS—Four 3½-in. telegraph service conduits were required for Toronto's new Stock Exchange.

WINCH SKIDS BOXES UPSTAIRS

To facilitate raising heavy boxes and equipment to the second floor of its tool storage building, the J. Livingston Company of New York, has bolted a 1,000-lb. capacity winch to the floor at the head of the stairway. Planks laid on the stair provide the skidway and a power drive attached to the winch



ELEVATOR SERVICE—Heavy equipment is skidded upstairs with this winch and power drive in a contractor's storehouse.

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FLAIR—

• • • *not heavy handed!*

The mere fact that the candidate for a given production job at Triangle has a flair for the work is but a step toward his engagement. Only until this flair *plus continued accuracy* is demonstrated can he be accepted into the coterie of production men. There is a broad distinction . . . and even though it did not improve the product it certainly is conducive toward right customer relations . . . so Triangle rewards ACCURACY because accuracy rewards Triangle.

TRIANGLE CONDUIT & CABLE CO., INC.
Horace Harding & Queens Blvds. ELMHURST, NEW YORK CITY, N. Y.

ARTERIES FOR ELECTRICAL SYSTEMS

It MUST *be right!*

Easy BENDING

ENAMELKOTE
GALVAKOTE
ELECTRICTUBE
HOTKOTE

"Easy bending conduit is in harmony with present day demands where speed and accuracy is required. Enamelkote, Galvakote, Hotkote or Electrictube(thinwall), will meet current Underwriters Laboratory requirements and are approved by all branches of the U. S. A. Government.

"Install one or more of these modern brands on your next job. They are especially designed so that a first class job can be guaranteed and you'll be proud of your work too. Samples can be had for the asking."

CLAYTON MARK & CO.
OPERA BUILDING
CHICAGO, ILL.

[FROM PAGE 32]

gives speedy service. The power drive is available for other applications about the shop when not in use on the winch.

JOB-AT-A-GLANCE FORM

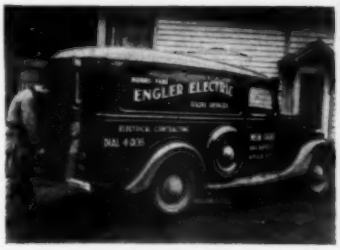
After a run of large jobs have been figured and bid letters placed in the pending file, it is not always so easy to recall the full details of a particular project. Often on short notice a check-back must be made for an owner or architect, to determine how many of this or that kind of outlet were included in a certain job. Usually this occurs after plans and specifications have been returned.

To simplify this situation for its electrical contractor clients, the Electrical Survey Bureau of Kansas City has an 8½-in. by 13½-in. printed form upon which all essential job information is noted. This information sheet is always the top page of every set of quantity sheets that comprised the larger surveys.

The form has spaces for name and location of job, owner, architect and engineer; who gets bid and when; identity of drawings and specifications; bid, bond and insurance requirements; description of building and services; a summary of outlets, and space at bottom of form for filling in special requirements.

ONE STOP SERVICE

A repair call to the Engler Electric Company, of Utica, N. Y., brings a truck with all the necessary tools and materials for any type of job. Trays racked inside carry materials for radio repairs, fixture repairs, plug and switch



ONE TRIP—This attractive truck is completely equipped for servicing all kinds of repair and installation jobs on the first call.

installations, range installations, and sign repairs. These jobs are serviced from the truck. A line of standard house fixtures are kept available and, frequently, a small repair job ends up in a sizable fixture installation.

The line of repair items carried has been built up from a long experience with residential work. Returns to the shop, for additional materials, are rare. This is an important factor in keeping the customer's good will.

INFORMATION SHEET

John Brown Estate

Estimate No. 37083
No. of Sheets 79
Date 9/2/1937

Location 937 Broadway, Flushing, N.Y.
Owner John Brown Estate
Architect Meyer & White and Co.
Engineer E. J. Smith
Bid to Architect
Bid at 4/1/37
Drawings Arch. Plan No. - No. 1208 - 28 Sheets
Specifications Arch. Plan No. 16

Certified Check $7500
Bond Yes
Liability Insurance P/L and P.D. $5,000.
Completion 1 Week after completion
Building Const. Fireproof
No. of Floors 8 and two Penthouses
Light Service } Contractor to arrange
Power Service }
3 ϕ - 4 wire - 208 Volts

REQUIREMENTS

Quantity	Description	Disposition	Quantity	Description	Disposition
792	Ceiling		191	Phones	Remove only
84	Bracket		1	Phone Service	3-2" U.G. Cond.
62	Floor		14	Bells	Furn. & Install
416	Receptacles		2	Annunciators	"
39	Radio Range		877	Fixtures	Install Only
167	Switches		12	Group Fire Alarms	Furn. & Install
56	3-Way J. Box		62	Box Receptacles	Furn. & Install
34	Light Meter	Furnish & Install	—	Lamps	by others
12	Power Meter	" "	16	Tel. Term. Cab.	Furn. & Install
1	Radio Apparatus	" "	28	Motors	Install & Connect
39	Panels Light		19	Motor Switches	Furn. & Install
15	Panels Power		22	Motor Starters	Install only
1	Main Sw. Bd.	See Spec. Book			
39	Connected Circuits				

Special Requirements:
#12 wire 30% spare
¾" conduit - #12 MINIMUM WIRE
Sketch of Space Allowed to Electric Meter
Color Code Indicating Boxes For Future Extension
Bond Alum. System
Special Panel wiring
Special Back Trimming at Garage by others. Labor not included for installing or furnishing to floor junction boxes

QUICK CHECKING — Essential information retained on summary sheet after plans and specifications are surrendered.

BULL DOG

FIRST IN QUALITY

FIRST IN PRESTIGE

BULL DOG SUPERBA LIGHTING PANELS

This artistic deluxe Bull Dog Panelboard creation costs no more than Panelboards of "just ordinary" appearance. Suitable for administration buildings, office buildings and general institutions.

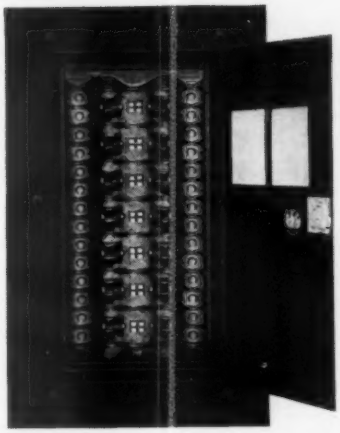
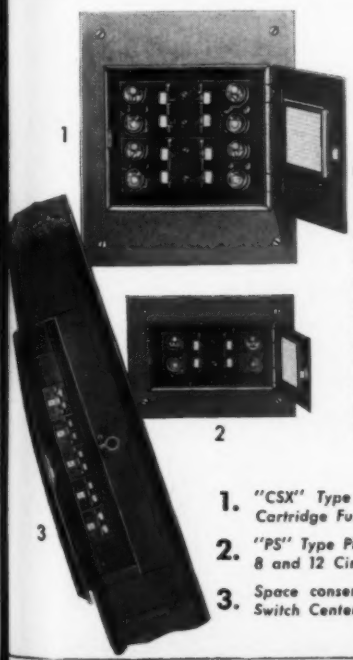


Illustration shows typical Superba Lighting Panel with lugs-only mains

BULL DOG *Vacu-Break* SAFETY SWITCHES

All the desirable, modern features are found in Bull Dog VACU-BREAK Safety Switches – stylined compact Cabinets . . . all arcing Doubly Sealed for extreme Safety Switching . . . SOLDERLESS WIRE GRIPS for utmost ease of installation. Bull Dog VACU-BREAK Safety Switches are definitely the safest, most efficient, most modern ever designed.

See your nearest Bull Dog jobber — ask him to Prove VACU-BREAK superiority



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2

3

BULL DOG SWITCH CENTERS

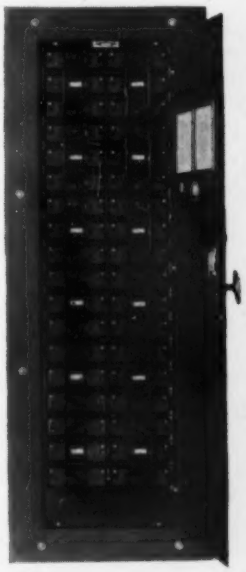
Bull Dog features a complete line of new, economical Panelboards for general use in factories, garages, warehouses and similar buildings. The space saving NARROW COLUMN type–for installation on columns or pilasters in industrial plants and commercial buildings–is included in the Bull Dog line.

1. *"CSX" Type Toggle Switches and Plug or Cartridge Fuse; 4 to 40 Circuits.*
2. *"PS" Type Plug Fuse and Toggle Switches, 4, 8 and 12 Circuits.*
3. *Space conserving Bull Dog Narrow Column Switch Centers for Industrial Use.*

BULL DOG *SAF-to-FUSE* DISTRIBUTION PANELBOARDS

These Panelboards are assemblies of fusible switch units, making up a flexible distributing system to meet the flexible needs of modern industry. Initial investment need cover only immediate circuit requirements but Mains and Busbars are such that additional circuits may be added at any time.

Bull Dog Engineering men, in all prominent cities, will gladly co-operate in your wiring layouts.

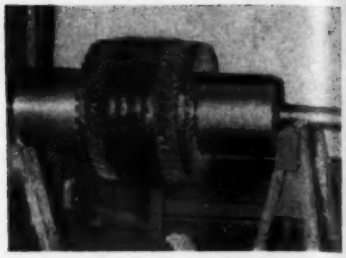


BULL DOG ELECTRIC PRODUCTS COMPANY

DETROIT, MICHIGAN

UMI

Motor Shops

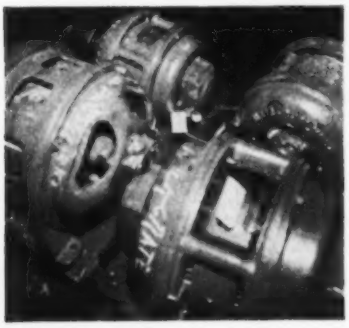


REWOUND—*The armature is ready to go back to the customer with little loss in production time.*

TAGGING MOTORS BY TRUCK LOADS

During Cincinnati's flood the Willy-Wray Electric Company took in water-soaked motors by truckloads, some customers sending as many as 130 pieces of apparatus. To organize this avalanche of business, a temporary method of tickets, tags, costing and billing was developed, which was called the "T & T System."

Since a lump-sum price schedule had been established for the emergency reconditioning of wet motors, according to type and size, conventional office procedure could be dispensed with, when the flood work started to pour in. There was no time-keeping for individual motor jobs, or no handling of separate material requisitions. Special records were made only where extra work was involved, such as installing new bearings. The complete lot of equipment for one particular customer could, therefore, be billed from the shipping records at the lump sum taken from the flat prices, plus whatever extras were involved. A single office work order number and bill was used to cover whatever "T & T" numbers a particular customer required for one or more lots, if they were received on different days.



COMPLETED MOTORS—Their "T & T" tag numbers were checked against receiving tickets and written up on delivery slips.

As equipment came in, the items were entered on a receiving slip, and two numbered metal tags were tied to each piece. These numbered tags provided a quick method of identification for completed work.

The entire payroll during this emergency was charged against the total production of "T & T" jobs, less extras. Total "T & T" billings as against all costs, including temporary ovens, extra steam piping, etc., then gave the company its gross margin of profit. Thus a mass production operation was conducted without a detailed job system.

RESTORED PLATING SERVICE

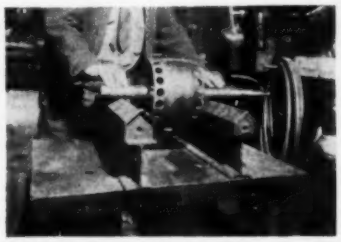
An emergency breakdown job gave the Electric Maintenance Service Company of Bridgeport, Conn., an opportunity to show some real service. A six-volt plating generator armature, rated 5,000 amp., at 600 rpm, was rewound over a week end.

Thirty-six commutator segments, weighing a total of 360 lbs., and 200 lbs. of No. 5 wire were used on the job. The U-shaped coils were formed from 5-ft. lengths, arranged six in parallel. Six men working an average of 66 hours each started the job at eight o'clock Saturday morning, working day and night to complete the work Monday.

FANNED OUT—*The coils are spread radially, ready for the commutator to be pressed onto the shaft.*

ROLL-TEST BALANCING

For checking unbalanced rotors and armatures, the Barker Fowler Electric Company of Lansing, Mich., built these bench type V-rails. By gently rolling, such equipment across the 25-in. rails, the mechanic can judge the adjustment required.



ROLLING TEST—Heavy bench with V-rails, used for balancing rotors and armatures.

To provide a stable working condition, the rails were mounted on 3-in. by 5-in. I-beams, which are mounted upon a 22-in. by 32-in. by 2½-in., thick steel bench top. No wabbling or skidding out of level occurs with this outfit.

TILT-IN SOLDERING RACK

For quick soldering of commutators on small refrigeration motors the H. N. Crowder, Jr. Company of Allentown, Pa. has built an adjustable rack. It permits the armature to be rotated in a solder ladle while it tilts at just the right angle to immerse the desired area of the commutator.

The rack was made up from standard pipe and fittings, using the wheel from a large valve stem for rotating the threaded nipple, to raise and lower the rack above the solder ladle. The commutator shafts rest on brackets that adjust up and down along the sloping arm. As designed, the mechanic has

THE NEW GOODRICH CATALOG IS READY!"

Announces SUNNY LUMENS *the Goodrich Reflexpert*

And this issue is bigger, better than ever—covering the most complete line of industrial lighting equipment on the market. In addition to all standard shapes and sizes of industrial fixtures, it's full of new ideas—new designs—exclusive Goodrich developments which make your lighting jobs easier to plan, easier to sell, easier to install.

Every electrical contractor who's on his toes should have this new Goodrich Catalog. The easy way to get your copy is to send us a post card.

Ask for Catalog No. 38

COMPLETE ENGINEERING SECTION

There's more than 30 pages of lighting layouts, mounting and spacing charts as well as curves for all Goodrich equipment listed . . . material that helps you sell, simplifies your installation and engineering problems.

GOODRICH

ELECTRIC COMPANY

OFFICES IN ALL PRINCIPAL CITIES

GENERAL OFFICES & FACTORY, 2902 NORTH OAKLEY AVENUE, CHICAGO, ILLINOIS

UMI

Designed for SERVICE

THE C & E SUPER-DUTY HAND PORTABLE

(PATENT PENDING)

This rugged and dependable portable lamp was made for general utility in industrial plants and railroad shops . . . made to be used under the most severe conditions *anywhere* . . . and it serves its purpose perfectly!

All Ericson Products are cheaper, in the long run, simply because they last longer and are safer. . . . recommended by many of the country's largest firms, who have made Ericson Products permanent part of their standard equipment.

WRITE today for complete catalog No. 37 to Ericson Mfg. Co., 5720 Euclid Avenue, Cleveland, Ohio . . . then order from your nearest wholesaler.

ABOVE—Greatest improvement in Lamp Guards since the advent of the Electric Light. So Easy to put on and remove, no tools needed, no screw heads to become worn and mutilated requiring a high priced mechanic to remove, or the guard destroyed to get off, and the lamp left unprotected and a hazard both to life and property. The special Thumb Screws are an integral part of the guard and are prevented from dropping out when the guard is opened for the removal of burnt out lamps by a fibre washer. These new shockproof guards have octagonal rings at the bottom to prevent rolling. Cadmium plated, they are equipped with swivel hooks. Full length half reflectors are available . . . also lamp guards furnished with regular screws, if desired.

LEFT—The C&E Socket Insert is designed especially for use in portable guards. It is the only one made that eliminates all strain from both connections and conductors. The strain is placed on the tough outside covering of the cord and not on the individual conductors, preventing the possibility of shorting, which is the case when knotting and fibre discs are used. The safety handle, made of heat cured, first grade rubber, has a special baked lacquer finish that sheds oil and acid. Live rubber at base and around cord makes it waterproof . . . a half inch wall protects the heavy duty insert socket. C&E Socket Puller makes easy work of inserting and removing sockets from handles.

THE ERICSON MANUFACTURING CO.

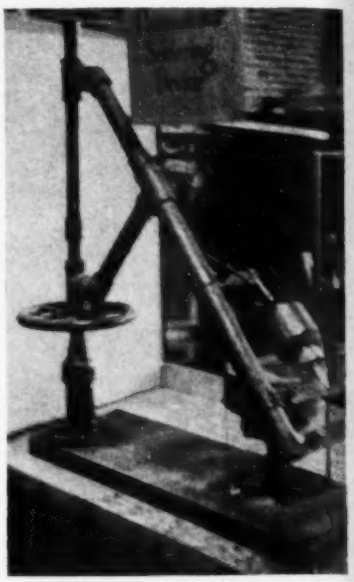
First to make rubber portable handle, plugs, etc.

5720 EUCLID AVE. **CLEVELAND, OHIO**

Warehouse Stocks at: Boston, Mass., Chicago, Ill., New York, N. Y., San Francisco, Cal., Seattle, Wash.

Motor Shops

[FROM PAGE 36]



IMMERSION SOLDERING—Tilting rack for small armatures, permits commutator to be rotated in solder ladle.

both hands free to rotate the armature carefully in order to secure just the amount of soldering that is desired.

FEATURES

SPECIAL SERVICE

A model service shop for automotive equipment was recently set up to supplement the regular motor repair shop, by the Queen City Electric Repair Company of Cumberland, Md. Then they went in for showmanship. The equipment given a glossy red enamelled finish and was placed in a front room, from which double swinging doors lead to the motor repair department. Altogether nine lighting units were provided at the various working points located in an 18-ft. by 16-ft. room.

SHOP SHOWMANSHIP—Front portion of shop where brightly painted equipment makes a show place of the auto-electric repair department.

UMI

ONE-PIECE OR MILLED-AND-GROUND COPPER PARTS

. . . REDUCES HEATING IN

Westinghouse DE-ION Safety Switches

● The keynote of every feature you will find in Westinghouse Safety Switches is SIMPLICITY. By reducing every detail to its most elementary terms, Westinghouse engineers add years of useful life, cut maintenance costs to the vanishing point.

Bases are of one-piece non-carbonizing composition. One-piece copper parts on switches rated 200 amperes and below are readily removable from the front, and do away with many possible sources of destructive heating. On switches 400 amperes and above, copper parts are of milled-and-ground construction, and are rear-connected. Complete base assembly is removable from the front. Inspection is a matter of merely opening the cabinet.

Another simple, though exclusive advantage lies in the Diamond-Pointed Break Jaw and Extended Blade. It confines beading to areas which fall *outside* the contact surfaces when the switch is closed. Further protection to working parts in high-voltage types is supplied by the famous Westinghouse "De-ion" Arc Quencher.

Westinghouse Safety Switches are available in all commercial sizes and ratings, Types A, C and D. For complete information, call your local:

Electrical Wholesaler **Electrical Contractor** **Motor Dealer**

In the past, arcs have been broken by "stretching." The "De-ion" quencher on 575 and 600-volt Westinghouse switches confines, divides and extinguishes arcs instantly—obviously preventing concentration of burning heat on contacts or arc barriers. J 20304

Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

Of course Merchants Want Double Lighting Value at no Extra Cost

Hammers are banging and saws are singing on Main Street. Merchants everywhere are remodeling long-neglected show windows and modernizing lighting systems.

Sterling **Lite-Flo Reflectors are the key to this wiring business. What merchant can resist double lighting value with the same operating cost?**

Despite their exceptional efficiency *Sterling* Reflectors cost no more than ordinary reflectors. No wonder contractors find them a big help in getting new business.

The attractive brochure, "Increased Sales Punch with Same Operating Cost" has been developed to help you get show window lighting business. Write today for your copy.

MAIL THIS COUPON

Reflector & Illuminating Co.,
1435 W. Hubbard St., Chicago

Send copy of brochure that tells about the marvelous improvement in display lighting afforded by *Sterling* Lite-Flo Reflectors.

Name.....

Address.....**City**.....**State**.....

Motor Shops

[FROM PAGE 38]

John Lighter, major domo of auto-electric repairs, keeps everything shipshape in this attractively arranged department, and has become thoroughly accustomed to his "gold-fish-bowl" production routine. The shop equipment consists of lathe, drill press, arbor press, a specially-made generator testing and analyzing panel, recharging magnets, fuel and vacuum pump testing apparatus, and a neat arrangement of benches and drawers for small tools.

SNUBBING STRIPPER

Snubbing a rope on a motor driven drum controls the pull of a sturdy stator stripping outfit in use at the Consolidated Electric Motor Repair Shop of New York City. A frame built up of 4x1¼ channel iron has a 1 hp, 3 phase motor and 40 to 1 gear reduction unit, mounted at the top, driving a 3-in. drum.

The stator to be stripped is placed on the platform and held down with two ¾-in. J bolts tightened from below with wheel nuts. The tongs are suspended from a ¾-in. rope wound 4 turns around the drum above. The other end of the rope is allowed to hang free.

WINCH STRIPPER—Provides easy control of tension on drum. Snubbing action eliminates danger of overload or damage to the frame.

In operation, the tongs are hooked into the stator coils and the free end of the rope drawn tight with the drum revolving. This snubs the rope on the drum, pulling the coil. Releasing the tension on the free end immediately releases the rope and the tongs may be drawn down and hooked into the next coil without stopping the motor.

A PRACTICAL NON-TAMPERABLE FUSE

RESISTS TAMPERING AND OVER-FUSEING

WIPES OUT ANY EXCUSE FOR TAMPERING

A Fustat can't be replaced by a penny or slug — and it is practically impossible to bridge it with tinfoil, strands of lamp cord or any other material.

Stops use of over-size fuses — a 20 or 30 ampere Fustat will not fit in a 15 ampere receptacle or adapter. Similar limitations apply to all other sizes.

Once you have installed the correct size to protect, your protection cannot be taken from you.

But that's not enough . . .

A non-tamperable fuse that would blow on starting currents would be an impractical device — a terrible nuisance — so the Fustat . . .

because —

IT STOPS NEEDLESS BLOWING

A Fustat won't blow when washing machines, refrigerators or other motors start. A 15 ampere Fustat will permit you to load an ordinary circuit to capacity — and yet not blow on motor starting.

It gives you SAFE PROTECTION without USELESS SHUTDOWNS.

Adapter fits Edison base fuse holders and locks in place.
Retails at 7½c

Protects flexible cords against burnout — in spite of its long time-lag

The Fustat contains a fuse. The ability of a fuse to protect against dangerous cord shorts or grounded sockets is well known.

The Fustat – HOLDS like a LARGE FUSE when safety permits, yet, OPENS like a SMALL FUSE when safety demands

Today's circuits demand the Fustat — *for what other device can . . .*

1. Make safe protection remain safe.
2. Stop loss of money on needless "blown fuse" service calls.
3. Permit adding more appliances to present circuits.

The FUSTAT

RETAIL PRICE ONLY 7½¢

Write for full information to any of the undersigned

BUSSMANN MFG CO
University at Jefferson
St. Louis, Mo.

KIRKMAN ENGINEERING CORP
124 Sixth St.
New York, New York

NATIONAL ELEC PRODUCTS CORP.
Fulton Bldg.,
Pittsburgh, Pa.

UMI

THE NEWEST IDEA

THIS NEW WIREMOLD OUTLET SYSTEM MAKES

HERE IT IS!

Outlets placed where needed — quickly!

MEETS ALL TRADE REQUIREMENTS

1. Based on sound engineering!
2. Proof against amateur tampering!
3. Installed by wireman only!
4. Assembled on the job!
5. For new or old buildings!

2127
A small sturdy Plug Receptacle with finding grooves for easy plug connection. Sets flush with Cover 2100C.

2100 C
Flush mounted cover

Width Overall 1¼"
Height Overall ⅞"

2100 C
Cover scored in (3 inch) sections equal in length to Receptacles No. 2127. Hence outlets may be placed anywhere, anytime — singly or in groups on 3-inch centers and up.

2100 B
Channel has knockouts for ½ inch conduit every 8 inches — also knockouts for screw holes.

CAPACITY up to 6 No. 12 wires.

SETS ON THE BASEBOARD

SETS INTO PLASTER

THE WIREMOLD COMPANY, Hartford, Co

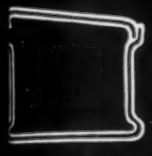
UMI

IN THE NEWEST BOOK

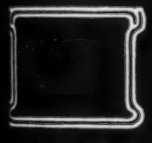
NEW WIREMOLD CATALOG DOUBLY INTERESTING

PLUGMOLD

THE WIREMOLD CONTINUOUS OUTLET SYSTEM



Cover 2100 C snaps into head of 2100 C

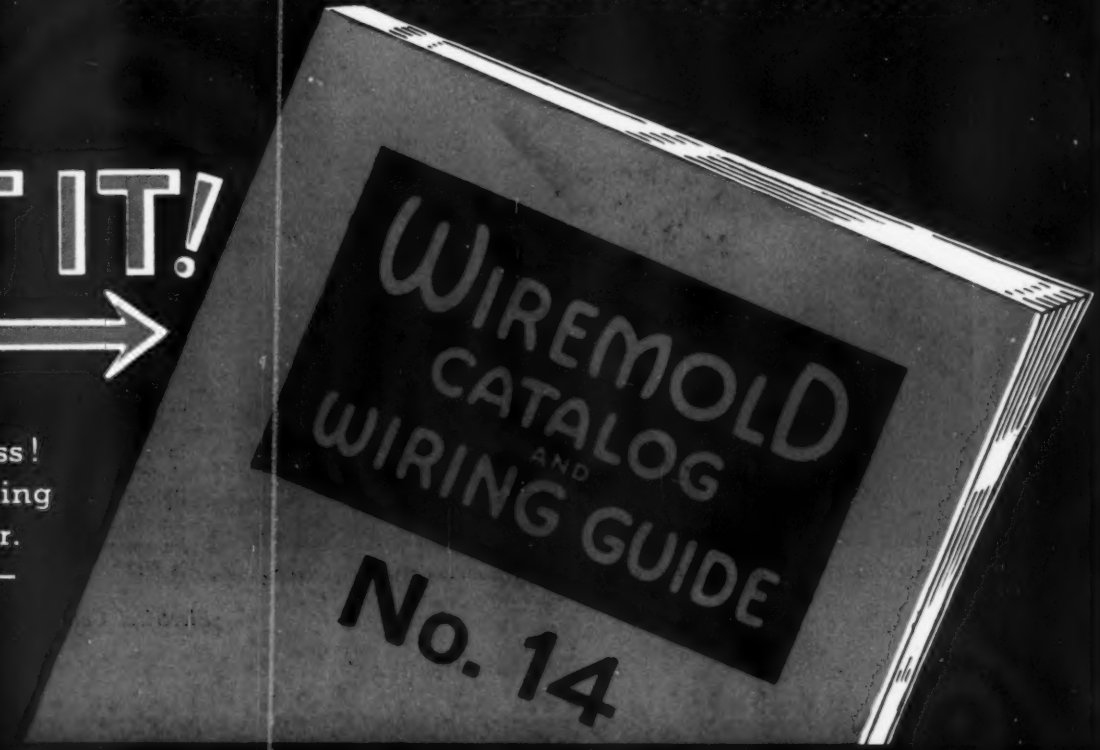


Cover 2100 C snapped into position

Provides for future growth and development of electric service without adding to your present investment

BECAUSE YOU CAN ALWAYS ADD NEW OUTLETS QUICKLY WHEN YOU NEED THEM — INSTALLING ONLY WHAT YOU NEED FOR TODAY!

GET IT!



Now on press! General mailing in September. Watch for it—make sure you get it!

Better Lighting

CONVERTIBLE SPORTS LIGHTING

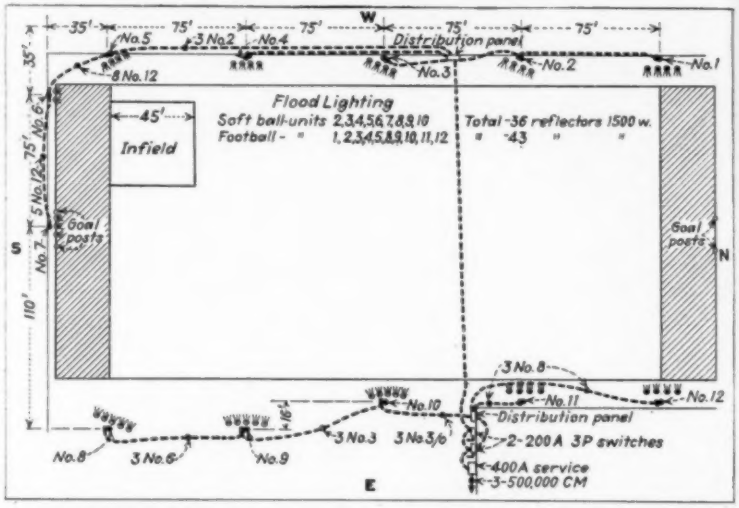
The Public Electric Constuction Company of Chicago has recently completed the installation of a convertible floodlighting system at the St. Phillips High School Stadium. During the spring and summer months the field is used for night soft-ball games. In the fall the stadium is rearranged to provide a gridiron for football. The floodlighting installation was designed to allow quick adaptation to either sport.

The soft-ball diamond is located at the southwest corner of the field. Two poles, one with three reflectors and the other with two, are spaced 75 feet apart, 40 feet back from the first base line. In deep left and center field, 185 feet from the plate, are three poles spaced 75 feet apart with five reflectors each. Twenty feet back from the third base line, four poles, with the same spacing carry sixteen reflectors. A total of 36 reflectors, each with 1500 watt lamps, light the field for night play.

For football, one additional set of four reflectors is mounted on a pole on the west side of the gridiron, and two additional sets on the east side. This omits five reflectors at the south end of the field which are not used in this set-up. A total of 43 reflectors light the gridiron.

A 400 amp. service feeds two 200 amp. three wire switches, each controlling one side of the field. Distribution panels at each side protect the three wire underground feeders. The feeder conduits are terminated at the poles in weatherproof cutout boxes with individual No. 12 wire circuits to each reflector.

The reflectors are open type, porcelain enameled, floodlights with aluminum concentrating reflector inserts. The banks of lights on each pole are made up of combinations of two and three unit, multiple pole top brackets of cast aluminum.



FLOODLIGHTING—Of this stadium is adaptable for soft ball during the spring and summer, and football during the autumn months.

NIGHT PLAY—On this bright soft ball diamond has double recreational value.

LIGHTING A TRIPLE MIRROR

The most common mistake made in lighting a triple mirror is the improper location of the lighting equipment. Generally the unit is attached to the top of the mirror or at the sides. As a result, an image of the bare lamp is reflected back into the eyes of anyone standing before the mirror. Also, the average unit employs only two lamps, totalling 80 watts or more, and this light is inadequate for this service.

But the mirror helps sell goods. Its lighting should enable the customer to make a detailed examination of the fit and appearance of a suit or dress without distracting glare.

One solution to the problem is shown in the accompanying illustration and sketch. The unit used is made of Alcoa lighting sheet. It is parabolic in contour and houses two 150-watt Mazda lamps, placed base to base. The light is directed toward the mirror, which in

Another Advance—

in SAFER and LOWER COST Maintenance of Lighting Equipment

BENJAMIN FLOOR-SERVICE TURNLOX

A New Optional Turnlox Feature which eliminates the use of the hazardous, time-wasting ladder in many locations. Costs but a few cents more than regular Turnlox Equipment.

Turnlox and now Floor-Service Turnlox! Two Benjamin developments, each with a definite place and purpose in the solution of the all-important maintenance problem.

Dirty reflectors and inefficient lamps can waste up to 80% of their rated efficiency. Frequent cleaning and inspection is therefore just as important to Right Lighting as the installation of the right type of lighting reflectors.

To simplify maintenance, minimize production interruptions, and reduce maintenance costs, Benjamin originated the Turnlox hood construction. Turnlox made it possible to remove the reflector and lamp as one unit for easy cleaning *on the floor*.

Now comes the Benjamin Floor-Service Turnlox to make possible the safe and easy removal of the reflector and the lamp as one unit *from the floor*. All of the familiar Turnlox advantages are retained. Floor-Service Turnlox units differ only in their bell mouthed hood construction.

Standing safely on the floor, it takes but a moment for the maintenance man to clamp the Benjamin Floor-Service Reflector Changer to the reflector rim. He then exerts a slight upward pressure on the changer shaft and turns left a quarter turn to remove or right to replace.

Quicker and easier, Benjamin Floor-Service Turnlox thus lowers maintenance costs, eliminates production interruptions and accident hazards in the servicing of reflectors mounted up to a height of eighteen feet.

Complete details and information concerning Turnlox reflectors available with the optional Floor-Service feature at a very slight increased cost may be had by writing or returning coupon to Benjamin Electric Mfg. Co., Des Plaines, Illinois.

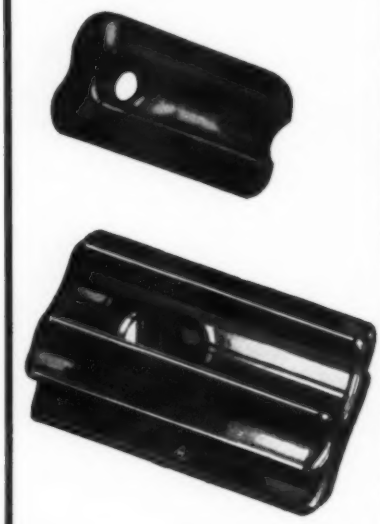
Benjamin Turnlox Reflectors available with the Optional Floor-Service Feature—
Turnlox RLM Dome Reflectors . . Turnlox Flat Cone Reflectors . . Turnlox Shallow Dome Reflectors . . Turnlox RLM Bowl Reflectors . . Turnlox Glassteel Diffusers . . Turnlox "Silvered Lamp" Diffusers . . Daylight Globe "Turnlox" Glassteel Diffusers . .
Also available are several of the Benjamin standard Mercury Lamp reflectors. Present Turnlox Installations of above reflectors may be converted into Floor-Service Equipment by a simple change in reflector hood.

UNSUSPECTED ROBBER
in industry is inadequate lighting.
Its elimination results in (1) Conservation of workers' eyesight; (2) Increased personal efficiency and health of employees; (3) Fewer Accidents; (4) Less Rejects and Spoilage; (5) Reduced Labor Turnover; (6)

ELECTRICAL CONTRACTORS — This message is being widely broadcast to industrial executives by Benjamin. Be sure to write for complete details concerning this important Floor-Service development.

ILLINOIS

STRAIN INSULATORS OF HIGH MECHANICAL AND DIELECTRIC STRENGTH



★ The porcelain used in Strain Insulators is homogenous in structure and has perfectly balanced interior structure. As a result they possess high dielectric and mechanical strength which assures through dependability in the line construction. We recommend wet process insulators for this service because of their greater strength. We can, however, supply either wet or dry process types. Ask for samples and catalog.

CENTRAL LOCATION INSURES QUICK DELIVERY anywhere in U.S.

ILLINOIS ELECTRIC PORCELAIN COMPANY
Macomb, Ill.

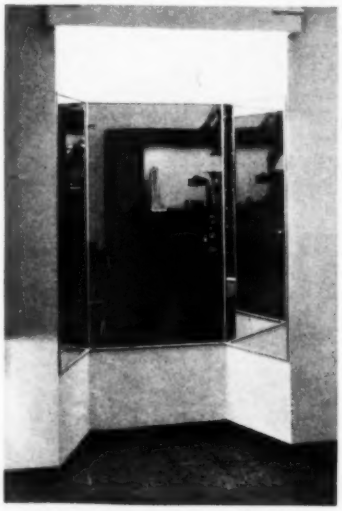
Better Lighting

[FROM PAGE 44]

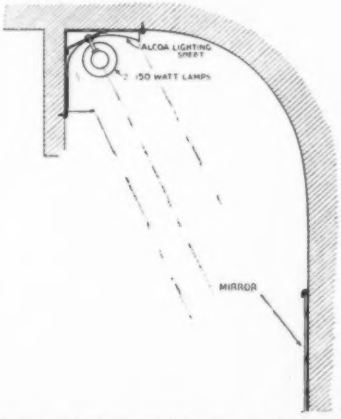
turn reflects it back on to the figure.

At the top of the mirror a curved sheet, painted a flat white, diffuses the light striking it. This diffused light helps to soften shadows, which the directional light from the mirror produces.

The height of the mirror is 72 inches. Investigation indicates that this height is the maximum, if reflected glare is to be eliminated.



AVOIDS REFLECTION—Poor lighting kills a triple mirror, but with this method results are sure.

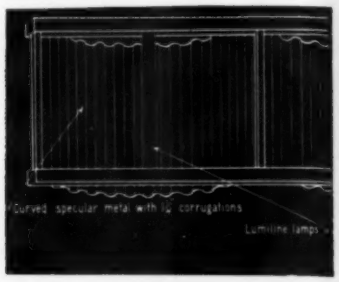


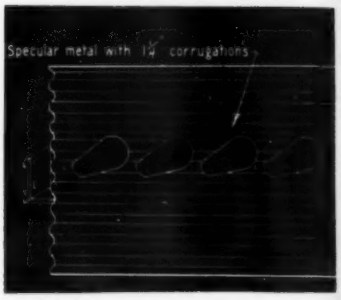
THE RIGHT WAY—Detail for installing arc lights on a triple mirror.

SPECULAR METAL WITH CORRUGATIONS

Corrugated metal and brushed stainless steel have the interesting property of spreading a source of light in one direction only. So spans of light are produced, in each case, as wide as the source of light itself. By taking advantage of this characteristic many interesting and colorful forms can be produced.

Inside colored bulbs produce satin-like effects. Natural colored lamps, or lamps with color hoods, give sparkling life-like reflections. Tubular sources produce wide bands of light. Both A-bulb lamps and lumiline lamps can be used separately or together with these surfaces.





MORE TRICKS — Decorative effects produced with backgrounds of corrugated metal.

OFFICE LIGHTING—This Hanna Building Office, in Cleveland. uses an indirect Abolite fixture, lamped with 500-watt inside frosted lamps. The ceilings are flat white, walls ivory. This bowl has 20-in. spread, triple enameled, white inside, ivory outside. The resulting light is soft and free from shadows.

UMI

Maintenance

USE OF ELECTRIC WELDING

By C. M. Taylor,
Vice-President, The Lincoln Electric Company, Cleveland, Ohio

Photo Courtesy of The Lincoln Electric Co.

THEY ARE NOT HOODED WARRIORS OF THE 25TH CENTURY!

They are 20th Century workmen using electric welding in a shipyard—to apply bottom plating on one of two cargo vessels being built at Great Lakes Engineering Works, River Rouge, Mich.

The ship illustrated is the largest ever built on the Great Lakes by the modern arc welding process, and among the largest ever constructed by welding anywhere. Use of electric arc welding not only speeds up construction, but also increases the vessel's carrying capacity 300 tons over what would be possible under former methods.

BECAUSE of its simplicity and diversified application, electric welding is an all-purpose tool capable of saving the electrical contractor and maintenance man a lot of time and money. Its effectiveness and economy have been steadily extended until today, it is an important item in construction, fabrication and manufacturing.

Electric welding fuses steel to steel in *construction:* bridges, buildings, homes, ships, airplanes; *in fabrication:* tanks, boilers, furnaces, cabinet furniture; and in *manufacturing:* large and small machinery, automobiles, railroad locomotives and cars, steel pipe, and the like.

Workmen, who have never had experience with electric welding are inclined to regard it as something very mysterious and complicated. This feeling is entirely erroneous. Although electricity produces the arc, electric welding in its application is purely a mechanical process. Thus, a man who is mechanically inclined can readily learn to weld with the electric arc. As with every other mechanical process, experience in its use improves the quality of the result.

An electric arc is simply a sustained spark betwen two terminals or electrodes. The most familiar is probably the one used in carbon arc lamps. The intense light from this lamp comes from the terrific heat created by the electricity passing across the gap between the two carbons. In electric welding, the arc is formed between the work being welded and a rod of metal, known as an electrode. When the tip of the electrode carrying the electric welding current is touched to a piece of steel a

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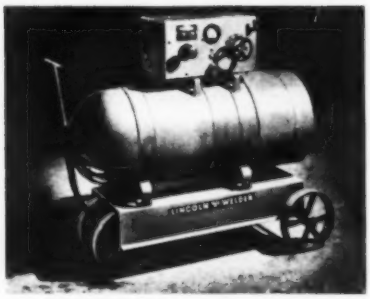
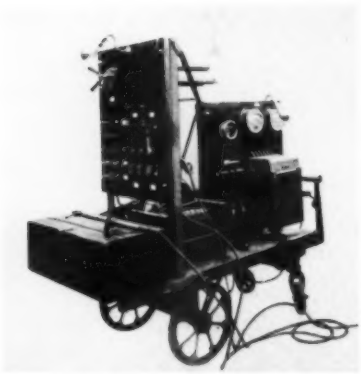


MODERN TYPE — Arc welder equipped with "dual continuous control."

STORAGE AND TOOL BOXES—Fabricated of sheet metal arc welded.

ODD OR INTRICATE SHAPES — Readily fabricated by electric welding



OLD-TYPE — Electric arc welder. Compare with modern type at top.

flash of bluish white is produced. The temperature of this electric arc is in the vicinity of 6,500 deg. F., and this tremendous heat, concentrated between the tip of the electrode and the metal being welded, melts both metals, that in the electrode and that in the plate. It blends them together so that when the work has cooled there is a solid union.

No intermediate connecting members are necessary in building anything with electric welding, nor are patterns of the work needed. All that the user of electric welding does in building any structure, no matter how large or small, is to cut up standard rolled steel shapes and plates into correct size and fuse them directly together.

There is no limitation as to the metals which can be fused together by this simple method. As a matter of fact, the process is now used in welding mild steel, high tensile steel, stainless steel, light-gage steel, high manganese steel and chrome steel, as well as cast iron, bronze, brass, copper and aluminum.

Parts of equipment, which have become broken in service, are repaired simply by taking the proper electrode designed for the metal of the part or equipment and fusing the breaks together. Machine parts, which have become worn, can be resurfaced with electric welding to enable the equipment to resist any type of wear action in service.

Power Used

Arc welding requires a continuous supply of electrical current of proper amperage and voltage. The voltage, in general ranges from 15 to 45. The current ranges from 20 or 25 amp. to as high as 600 or 800 amp. Either d.c. or a.c. may be used; however, in actual practice, the former is by far more commonly employed.

The latest method of obtaining current of proper amount and voltage is by means of a motor generator of the so-called variable voltage type designed for such characteristics that the voltage automatically adapts itself to the variable voltages demanded by the welding arc. The "dual control" on the generator pictured here is designed to provide just the right arc for every welding application. The operator adjusts both arc heat and penetration in a continuous sequence of small steps.

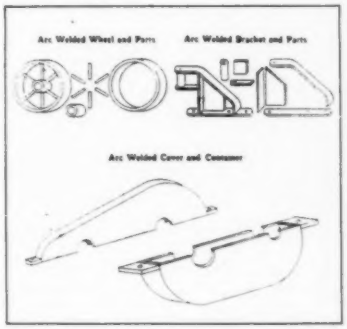
Welding current is usually conducted from the generator to the work by multi-strand copper cable, well insulated. The direction of flow of welding current for bare or washed electrodes is from the generator to the work, to the electrode, through the electrode holder, then through another cable to the machine. This is known as "straight polarity." For welding by the shielded arc process, the direction of the flow of current is usually opposite that of "straight polarity." The polarity is then termed "reversed."

A Handy Tool

Maintenance men will find the arc welder the simplest tool available for joining metals. If employed to the fullest possible extent, an arc welder will soon pay for itself, because of the many practical and economical opportunities for its use. For example: if a special type of truck body for hauling material is required, it is a simple matter to design a body for welded construction and then build it by cutting up standard steel shapes and plates and fusing them together to make the truck. This same simplicity may be applied to other types of equipment. The accompanying illustrations show a variety of miscellaneous applications.

A wide selection of sizes, types and prices of welding generators is available. Small units on hand trucks can be used for light work and miscellaneous repairs. If a used auto engine and trailer frame are available, and if heavy as well as light work is anticipated, a separator generator of higher capacity can be obtained for mounting on the trailer, with the gasoline engine as prime mover. However, it is usually more economical in the long run to obtain a factory rebuilt gasoline engine welding outfit. If the first cost is not the all-important factor, and if the welder is intended for shop use entirely, the motor-driven welder is usually preferable. For trips into the field the standard model gasoline engine driven welding machine, mounted or unmounted on a truck, is very satisfactory. Standard model machines can do practically any type of work economically.

The picture of the old-type electric arc welder, is presented for purposes of comparison with its modern successor. The great advance made in the art of electric arc welding during the past quarter of a century can well be expressed by the phrase "simplicity of operation and economy."



MISCELLANEOUS SHAPES—Replacement parts and fabricated equipment made readily by electric welding.

TYPES OF JOINTS FOR ARC WELDING

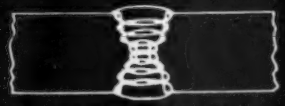
BUTT JOINTS

1. PLAIN BUTT JOINT. Largely used on plates up to $\frac{3}{8}$" thick with metal electrode $\frac{1}{4}$" with carbon electrode, although generally used below this. Inexpensive as to preparation of joint. Suitable for all usual load conditions if full penetration is secured.

2. SINGLE V BUTT JOINT. Used largely for $\frac{3}{8}$" plate or thicker. Scarfing and machining costs more than (1) and more electrode used than in (1). Used generally on plates thicker than in (1). Meets all general or usual load conditions.

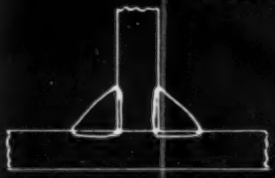
3. DOUBLE V BUTT JOINT. The cost of machining is greater but less weld metal is used than in (2). Cost of machining and welding should be balanced against each other. Used largely for $\frac{1}{2}$" and heavier, and for all usual loads. Note that joint is welded from both sides.

4. SINGLE U BUTT JOINT. Generally used on plates heavier than preceding—$\frac{1}{2}$", $\frac{3}{4}$" and over. Costs more to machine than single V but requires less electrode. Is welded from one side, except a single bead, which is put in last on opposite side. Meets all usual load conditions. Usually used for best quality work.



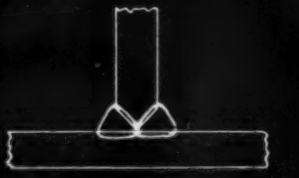
5. DOUBLE U BUTT JOINT. Used where welds can be made from both sides—in plate sizes usually heavier than in (4) and where the saving in electrode used justifies the greater machining cost as compared to double V. Used in all types of loads.

TEE JOINTS

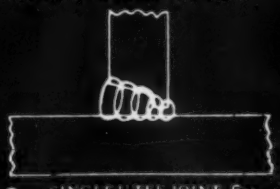


6. PLAIN FILLET WELDED TEE JOINT. May be used for all ordinary plate sizes. No machining of plates. Most satisfactory when welds are in longitudinal shear. For welds heavily loaded transversely by fatigue or severe impact, use with caution.

7. SINGLE V TEE JOINT. This is better than (6). For work welded from one side. Generally used on $\frac{1}{2}$" plates or lighter. Costs more for joint preparation but uses less electrode than (6). For more severe load conditions as outlined in (6).



8. DOUBLE V TEE JOINT. Used for heavy plates. Welded from both sides. Uses less electrode than (6). May be used for severe longitudinal or transverse loads of all kinds.



9. SINGLE U TEE JOINT. For usual size plates, generally 1" and heavier. Welded from one side only. Advisable to put in a final finish bead on side away from U. Machining costs more but takes less electrode than single V. For same load conditions as given under single V, (7).

10. DOUBLE U TEE JOINT. For plates generally $1\frac{1}{2}$" and heavier which can be welded from both sides. More expensive preparation but uses less electrode than (8). For all load conditions, even very severe.

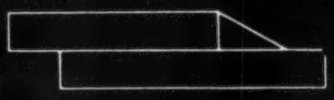
CORNER JOINTS

11. FLUSH CORNER JOINT. Generally used for 12 gauge and lighter. May be used for heavier plates with caution. Not for very severe loads on heavier plate.

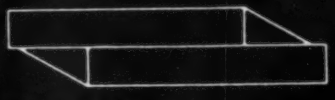
12. HALF OPEN CORNER JOINT. Generally used for 12 gauge or heavier, where welded from one side only. "Shouldering" effect reduces probability of burning-through and makes for easy welding. May be used for ordinary loads, but with caution for fatigue or impact loads.

13. FULL OPEN CORNER JOINT. Used for all plate thickness when welds can be made from both sides. May be used under severe load conditions, for maximum strength.

LAP JOINTS



14. SINGLE BEAD LAP JOINT. May be used for all sizes of plates where joints are not subject to excessive fatigue or high impact loads.



15. DOUBLE BEAD LAP JOINT. Better than (14). May be used for load conditions more severe than single bead lap joint. Beads should be full size, and joints may be loaded much more severely than (14). The butt joint (1-5) is the best joint for very severe service but of course is more expensive.

EDGE JOINT

16. EDGE JOINT. Generally used for $\frac{1}{4}$" or thinner. Not recommended for heavier work. For loads which are not very severe.

Courtesy, The Lincoln Electric Co.

NO OTHER RACEWAY FOR WIRING CAN GIVE YOU *all* THESE FEATURES

- Cold-Rolled Open-Hearth Steel
- 100% Electric Resistance Weld
- Adequate Protection
- ✓ Light Weight
- Easy to Cut
- Easy to Bend and Rebend
- No Threads
- 3 Simple Fittings
- Knurled Inside Surface
- Uniform Corrosion-Resistance
- Easy to Install
- Universal Acceptance
- Low Cost
- Widespread Distribution
- Assistance of a Field Force

Yours for

ELECTRUNITE Steeltubes

Reg. U. S. Pat. Off.

MORE THAN 150,000,000 FEET INSTALLED

...ighter Work...

WITH THIS BETTER RACEWAY FOR WIRING

So light in weight—and yet so strong—genuine ELECTRUNITE Steeltubes weighs less than half as much as ordinary conduit.* It takes the "back-break" and "arm-ache" out of installation, especially where runs are overhead, in shafts or in other difficult locations.

And this saving in weight does not impair protection to wiring. The wall of ELECTRUNITE Steeltubes—made to Underwriter's recommendations—need not be cut away and weakened by threading since Steeltube runs are assembled with threadless compression fittings. Hence, protection at joints is even greater than with threaded conduit.

Ask your wholesaler—or write us for the full story on this cost-saving threadless rigid conduit.

*A ten-foot length of ¾" ELECTRUNITE Steeltubes weighs 4.8 pounds. A ten-foot length of ¾" ordinary conduit weighs 11.3 pounds. Think what this saving in weight means to you in installation.

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Knurled inside finish (Pat. No. 1,962,876) available in ½", ¾" and 1" sizes.

ELECTRICAL DIVISION

Steel and Tubes, Inc.

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

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EASY STARTING-
AT ANY ANGLE!

MILFORD FLEXIBLE
The Blade with the
EASY-STARTING TEETH

Electricians prefer this electrical saw. It cuts cleanly, will not break in a frame, and is safe.

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There is no wrong way to use this blade. Start a cut on any angle or a corner. The fine, Easy-Starting Teeth take hold at once; will not rip out, and guide the blade for straight, clean cutting.

Ask your jobber for
MILFORD FLEXIBLE
The Blade with the
EASY-STARTING TEETH

THE HENRY G. THOMPSON & SON CO.
NEW HAVEN, CONN.
Saw Makers for over Half a Century

MIKE'S MAINTENANCE MANUAL

Dips and Bakes Beat Air-Dry Fakes

By J. M. Zimmerman
Service Division.
Westinghouse Electric & Manufacturing Co. Chicago, Ill.

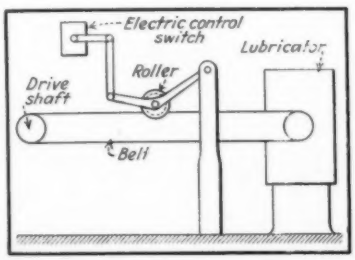
ON NEW and repair jobs, the equipment manufacturer always dips and bakes new motor windings to keep out moisture, oil, acid, fumes and other harmful elements. On open-slot motors the coil conductors are given one or two dips and bakes after the coil is formed, so that the compound can penetrate the conductor insulations thoroughly. This reenforces a normally weak insulation, changes it from a heating-insulating to a heat-conducting medium, and prevents moisture absorption. A final dip and bake before assembling in the motor fills all air pockets in the completed coils. After winding, a final varnish and oven treatment seals the armature against the elements.

An irresponsible electrician will rewind the same job complete without impregnation. He either paints the finished winding with a nice glossy finishing varnish, or dips it in an air-dry varnish. This finish may compare in looks with the well-impregnated job, but the elements will surely tell the difference. If you do not believe this statement submerge two such jobs in water and take megger tests on each at very short intervals. The values obtained will convince you that dips and bakes are preferred to air-dry fakes.

Belt Breakage Stops Motor

The "chief" paused at the door of the compressor room.—"*Zip, slap, slap, slap!*" He knew at once that a belt had broken—the belt driving the lubricator on one of the motor-driven air compressors. Fortunately, he was present when it happened. The equipment might have been seriously damaged through lack of lubrication.

Each compressor has now been equipped with a simplified device which will disconnect the motor from the line if the belt breaks again.



***ZIP, SLAP, SLAP**—If lubricator belt breaks, weight of roller and arm opens control circuit and stops motor.*

A small roller, with guides on each side, rides continuously on the lubricator belt. A projection of the roller arm is connected by chain to a control switch directly above. If the belt breaks the roller and arm will drop, opening the control circuit through the switch and, in turn, open the main line contactor on the 2,300-volt circuit to the motor.

Control Centralized for Maintenance

Can electrical control equipment for production machines be placed so as to provide—

1. Short connections between it and machines controlled;
2. Centralized control yet have remote control at individual machines;
3. Controlled machines within view of centralized control;
4. Nearness to load center to permit maximum use of feeder investment;
5. Use of unproductive space;
6. Ease of making changes or extensions;

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SAVE LABOR AND MATERIAL WITH

IRV-O-SLOT

...The most economical and convenient type of insulation for armature slots...Supplied in sheets or strips or cut to slot sizes...It saves both labor and material and simplifies the winding job.

IRV-O-SLOT...Is a varnished cambric insulation duplexed with any standard thickness of fibrous insulation. The materials are cemented with a flexible binder that permits shaping without separation of the layers.

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Write today for prices and samples ... IRV-O-SLOT is most economical.

IRVINGTON VARNISH & INSULATOR CO.

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VARNISHED SILK • FLEXIBLE VARNISHED TUBING • VARNISHES AND COMPOUNDS

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Prest-O-Lite Trade-Mark **TORCHES AND SOLDERING IRONS... *ideal for electrical work***

● ***Prest-O-Lite*** **Torches and Soldering Irons are available in convenient and moderately priced outfits, covering every open-flame or enclosed-flame requirement of the electrical contractor. These appliances are economical equipment for soldering, heating and brazing.**

Prest-O-Lite **appliances operate on** ***Prest-O-Lite*** **Gas, which can be obtained conveniently in small tanks at any of the thousands of** ***Prest-O-Lite*** **Gas Exchange Service Stations. You exchange your empty tank for a full one and pay for the gas only.**

Your jobber will gladly demonstrate the many features of ***Prest-O-Lite*** **equipment. Call him, or write the Linde office near you.**

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
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New York and Principal Cities
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Dominion Oxygen Company, Limited, Toronto

7. Ready accessibility for inspection and maintenance.

Here is the way one industrial plant solved the problem. The starters for all the machines in a department were grouped on panels on a catwalk over the working area. They were separated at intervals by panels containing cut-outs for each circuit. Circuits to and from the starters were placed in ducts, that can be easily opened for inspection or changes. Each starter has an individual start and stop push button and remote control is placed at the machines.

One Man Lamp Cleanings

Plant ladders have too long interferred with the cleaning of industrial lamps and reflectors. If the ladder was available, it was usually a shaky contraption that discouraged the maintenance man from doing this job well. As a result reflectors went uncleaned, dirt layers accumulated, and the absorption mounted porportionately on the reflecting surface. So the owner paid for current but did not receive the maximum lumen output of light.

But now the relamping and cleaning can be a simple mechanical operation accomplished by the maintenance man while he stays on the floor. One man with a relamping device can accomplish in thirty seconds what two men formerly completed in five minutes, and the hazard of a ladder has been entirely eliminated. These easy maintenance systems for industrial reflectors are in successful operation in many large industrial plants, and help maintain a rigid cleaning schedule.

QUICK CLEANING AND RELAMPING*—George Worthington Co., Cleveland, removes reflectors with no need for a ladder. Lamps in RLM glass-steel reflectors are on 10 ft. centers, and provide 18 footcandles on the packing tables.*

Research Building's Boss

When Pittsburgh's new Mellon Institute of Industrial Research was planned, the building superintendent was not overlooked. F. C. Hicks has an office, that is in keeping with the responsibilities he must carry to keep

FUNCTION CHECKERS*— Building superintendent in new research structure has equipment that tells at a glance what is happening elsewhere.*

the many important services of 200 research laboratories functioning smoothly, in this 8-million dollar monument to science.

Along one wall in the superintendent's office are important gauges that tell him at a glance about various air pressures. There are five master remote controls of the automatic temperature regulating system.

To the right of the gauge board is a push-button and pilot panel which provides remote supervision of important fans throughout the building. Above this panel is a lamp annunciator that flashes the travels of night watchmen along their route, and indicates at which one of several building entrances a wee-hour caller may be pushing a signal button. At the extreme right is a metal wall case for housing emergency supplies of various kinds.

The actual work shops for electricians, plumbers, steam fitters, carpenters, sheet metal workers, etc., are located elsewhere in rooms equipped to suit the maintenance needs of each trade.

Get Rid of Chills!

This is one time of the year when heating units show their worth—when the chill can be driven from certain plant areas without starting the main heating plant. Electric space heaters are available for such auxiliary services for cool days.

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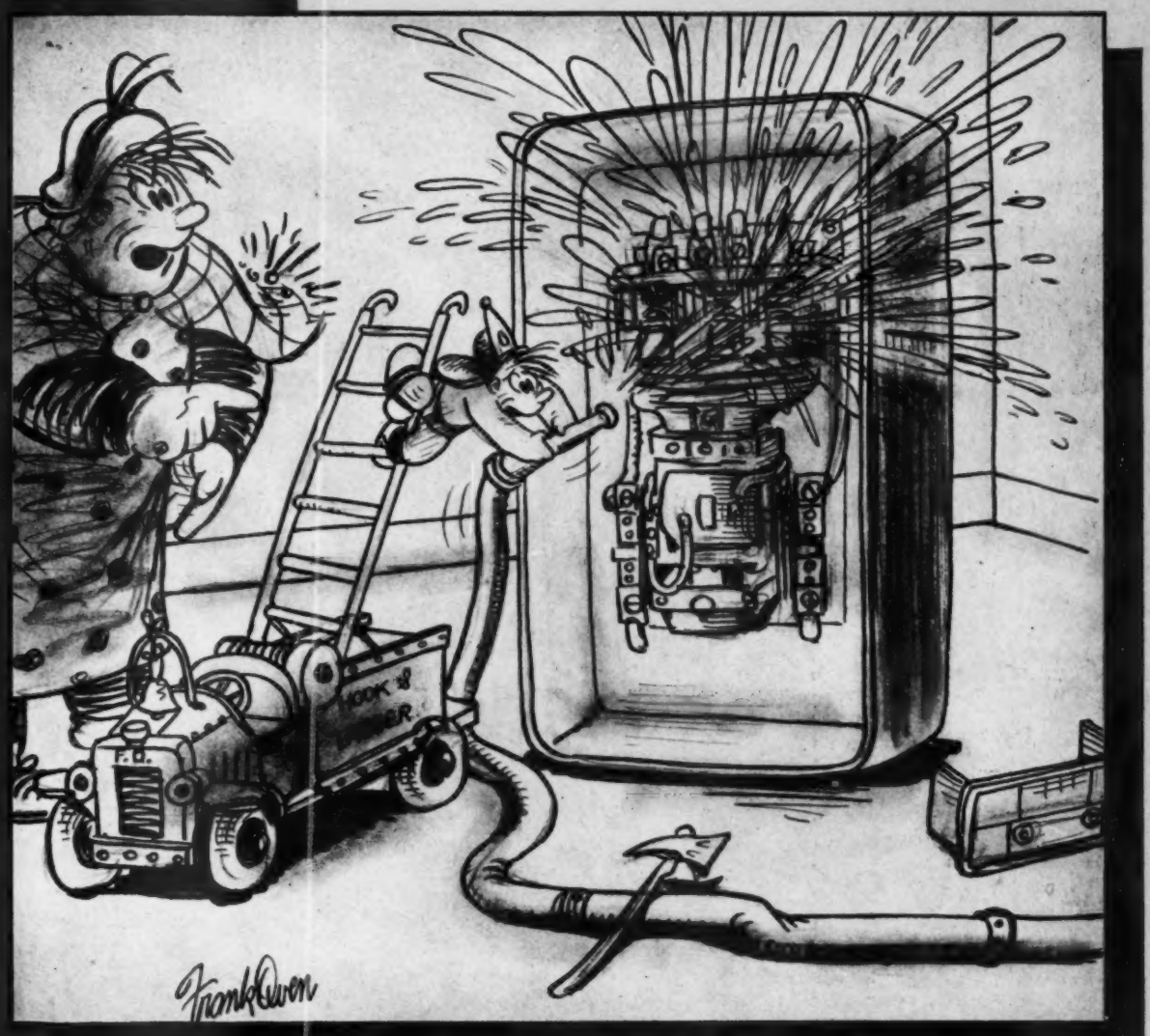
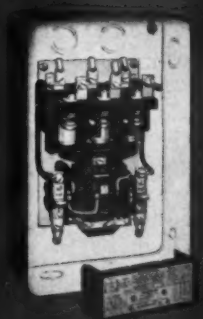




Bulletin 709 automatic solenoid type starter with arc hood removed to show line contacts.

"Stop, Philbert! There isn't any fire up there!"

This is one on Philbert! He didn't know this was an Allen-Bradley solenoid starter, which doesn't flash and flame like other starters. Arcs that form are immediately extinguished. Double break contacts cut the voltage in two—cadmium silver contacts deionize the arc—totally enclosed arc chambers snuff it out. That's why Allen-Bradley solenoid starters easily disrupt currents of not less than ten times their maximum horsepower rating, without burning, blistering, or welding the contacts.

The double break, silver alloy contacts on Allen-Bradley solenoid starters must never be cleaned or filed! They are always in first-class operating condition. Any oxides that may form on these silver alloy contacts will conduct current just as well as the contact metal itself.

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

NEW!

BULLETIN 800

Heavy Duty Push Button Stations

The push button mechanism is of the unit type with double break, silver alloy contacts. It can be arranged in combinations of from one to ten buttons for any service.

Bulletin 800, Type 800-2SH with cover plate removed.

Surface mounting stations have an attractive, black enameled, pressed steel enclosing box with multiple knockouts. Removing the front cover exposes both the front and sides.

Cover of Bulletin 800, Type 800-2SH.

Send for New Bulletin 800

Allen-Bradley Co.
1307 S. First St.
Milwaukee, Wis.

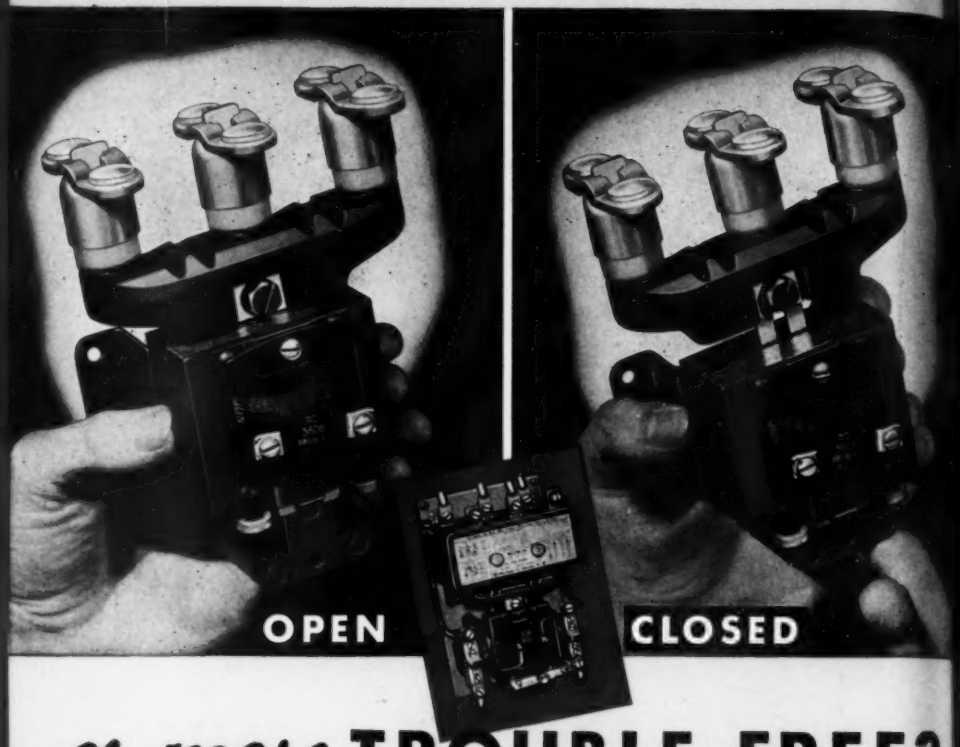
Please send me Bulletin 800.

Name.....

Firm.....

Address.....

What could be simpler



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No pivots—no pins—no bearings—no complicated mechanism—just a direct connection from the plunger to the contacts. That's the secret of the Allen-Bradley solenoid starter's trouble-free performance. Wear, dirt, or corrosion cannot interfere with its smooth, frictionless operation.

Not only is the Bulletin 709 solenoid starter the most simple starter on the market, it is also the most compact. Nevertheless, all Bulletin 709 starters will easily disrupt currents of not less than ten times their maximum horsepower rating. The double break, silver alloy contacts on Bulletin 709 solenoid starters never need filing. Hence, these silver alloy contacts outlast many ordinary copper-to-copper contacts.

Note the generous wiring space, white enameled cabinet interiors, front-of-panel wiring, accessible terminal connections, removable cabinet covers, and the many knockouts on Allen-Bradley solenoid starters. Then you'll see why installation and inspection of these starters is so simple. Write for the latest Allen-Bradley booklet, "The Story of the Solenoid Starter."

Other Allen-Bradley Solenoid Starters

REVERSING SWITCH
Bulletin 705 solenoid reversing switch. The contactors are mechanically interlocked.

COMBINATION STARTER
Bulletin 712 combination automatic solenoid starter and disconnect switch.

RESISTANCE STARTER
Bulletin 740 automatic resistance type starter.

MULTI-SPEED STARTER
Bulletin 715 automatic solenoid starter for multi-speed motors. No back-of-panel wiring.

A-B

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

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Questions ON THE Code

An Inspector's Code Questions

"Your Questions on the Code certainly are very enlightening, not only to electrical contractors but electrical inspectors as well. The writer has a few to ask which he will appreciate having answered. Some of these questions may seem elementary, yet your answers will be greatly welcomed in the upholding of decisions I have rendered.—A. H. W., Electrical Inspector."

Q. No. 1. *"The Code very definitely sanctions two insulated and one bare No. 6 in one inch conduit—What about two insulated No. 8 wires and one uninsulated eight in three-quarter inch conduit? I have reference to a service."*

A. No. 1. The Code gives dimensions of rubber covered and lead covered wires, but does not give the area of bare copper wire. However, a manufacturer's table gives this as .013 sq. inch. The Code gives the area of #8 rubber covered wire as .071. Then $2 \times .071 = .142 + .013 = .155$ sq. in. which is the area of two #8 rubber covered and one bare #8 wires. For three wires in a conduit, Table #5 requires that the wires fill only 43 per cent of the conduit. Trying a $\frac{3}{4}$ inch conduit of which the cross sectional interior area is .53 sq. in., we find that $.53 \times .43 = .2279$ sq. in., which is larger than .155 sq. in. Therefore this combination would be permissible in a $\frac{3}{4}$ inch conduit.

Q. No. 2. *"Does the Code make provision for the use of grounding bushings in connection with electric metallic tubing, flexible conduit and armored cable which may be wired from an entrance switch?"*

A. No. 2. Rule 908b requires that where metal raceways are used with conductors of over 150 volts to ground or in hazardous locations, special means for grounding be employed. It states that the locknut bushing or double lockout type of construction is not sufficient, but requires approved threaded fittings, approved threadless fittings, bonding jumpers or other approved devices (such as grounding bushings) be employed. But for ordinary locations and voltages the grounding bushings are not required beyond the service connections and would not be required on any armor on the house or load side of the service equipment.

Q. No. 3. *Is it permissible to splice onto an uninsulated neutral somewhere ahead of the entrance switch with a ground wire, provided of course the side wire complies with the Code in other respects? Suppose a No. 4 wire is used from the weatherhead to entrance switch, thence to a distribution panel some 40 feet within the building and No. 6 uninsulated stranded copper wires are run from water pipe to the neutral of this panel. Would such an arrangement be permitted?*

***PROVINCIAL CHIEF**—To cover the Province of Quebec requires 62 electrical inspectors, who operate from twelve offices, all under the supervision of J. N. Mochon, chief of the Board of Electrical Examiners for the Department of Labor. Mr. Mochon has headquarters at Montreal, and has been in the government service since 1919, and instrumental in the steady broadening of Quebec's licensing and inspection regulations. About 100,000 electrical inspections are made per year, and license examinations have been conducted for about 2,600 contractors and 6,300 journeymen.*

A. No. 3. Rule 903b requires that the neutral of a distribution system be grounded *at each individual service on the supply side of the service switch* and Rule 903e requires that the grounding connection be made at this one place only. Therefore, it is not permissible to make the grounding connection at the panel some 40 feet within the building.

Q. No. 4. *"Is it permissible to run non-metallic sheathed cable down between the hollow places of cement blocks, provided the condition is guaranteed to be permanently dry.*

A. No. 4. There seems to be no objection mentioned in the Code to this, provided the cable is properly supported and secured as required by 507 c l.

Q. No. 5. *Would not lead covered wire be permitted up through a metal lamp post from the base to the socket?"*

A. No. 5. If the lamp post is constructed in accordance with Rule 1401, and in particular with 1401d, it would be permissible to use lead covered wire as the fixture wire. The fourth sentence of 1402d shows that certain fixtures may be wired with approved rubber covered wire, and lead covered wire is also rubber covered.

Q. No. 6. *"If the owner of a factory had on hand a 60 ampere three pole, fused switch, would No. 8 wire, of which the carrying capacity is 35 amp., be permitted, or would you require No. 6 or No. 4 wire?"*

A. No. 6. There is no reason why a 60 ampere switch could not be used with No. 8 wire. With No. 8 wire the largest fuse permitted would be 35 amperes and a 60 amp. fused switch would accommodate the 35 amp. fuse.

Q. No. 7. *"Do the Underwriters have a list of insulating materials approved with non-metallic sheathed cable? Knob and tube? I have reference to insulation used in building construction such as snow flake, etc. The Code specifies what kind of materials are permitted, but the Inspector has no testing facilities to determine what the material is made of.*

A. No. 7. The Underwriters Laboratories do list several makes of thermal house insulation. The approved insulations are non-corrosive, non-combustible and non-conducting, and will have no deleterious effects upon the insulation of wires. These thermal insulations may be used with any of the approved types of wiring methods.

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Frank Adam
ELECTRIC COMPANY
ST. LOUIS

Questions on the Code

[FROM PAGE 57]

Q. No. 8. *"How many fractional H.P. motors are permitted on a circuit without separate protection?"*

A. No. 8. The solution to this problem is found in Rule 808e, exception 2, wherein it is found that motors with ratings of not over 6 amperes each may be grouped on one circuit provided the overcurrent device does not exceed 15 amps. at 125 volts or 10 amps. at 250 volts and the total load does not exceed 1320 volt amperes or when the overcurrent device does not exceed 25 amps, where an appliance branch circuit is used. Of course with automatically started motors of $\frac{1}{8}$ to 1 H.P. each, each motor must be provided with an overcurrent device rated at not over 140 per cent of the motor ampere rating.

Q. No. 9. *"It has always been considered a violation to conceal outlet boxes, but what about a job of knob and tube which has been installed for many years and it is desired to tap a line of non-metallic sheathed cable on circuit between the floors and use an outlet box? We know an "A" fitting would be O.K. What would be the difference?"*

A. No. 9. Outlet and junction boxes must always be readily accessible. A junction box installed under the floor would not be readily accessible and would therefore not be permitted. Where it is desired to extend a knob and tube job with non-metallic sheathed cable, it is necessary to make the junction in an accessible box. The knob and tube work could be extended to such a box and then the cable connected to it in the box.

Q. No. 10. *"Last but not least—Is there anything in the Code which makes it a violaton to install wires from a remote control switch in the same conduit as the wires leading to the motor?"*

A. No. 10. If the remote control wires use line voltage and secure their current directly from the supply system, there would be no question but that this would be permitted. But in case the control circuits receive their supply from another source, such as a transformer, then Rule 500f (4th sentence), specifically permits these wires to be placed in the same raceway as the motor circuit wires.

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO WIRES • SIGNAL CABLE • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

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THE JOB TO BE DONE—Rewiring Bancroft Hall with Four No. 12 Wires (Federal Spec. JC-106) to replace Two No. 14 Wires to take care of increased loads.

THE ODDS AGAINST IT—Construction of building made installation of new conduit highly impractical. Old ½" conduit, half laid in 1904 and balance in 1918, badly rusted in many places; runs up to 140 ft. between pull boxes; two or three bends to each run, most of them 90 degree elbows. . . . And the job had to be done in the heat of the Summer when the Midshipmen were off on their "shakedown" cruise.

THE JOB MASTERED—Hundreds of thousands of feet of MORE WIRES OF HEAVIER CAPACITY pulled through in record time with practically no trouble—AND NO OTHER LUBRICANT was needed, except in a few isolated instances, than CRESCENT SAFECOTE "SLICK" FINISH

THOSE ARE THE FACTS!—*There's* proof of the economy and ease of installation of CRESCENT SAFECOTE when put to the test. When *you* want to cut time and labor costs on *your* installations—remember Bancroft Hall and get in touch with the nearest Crescent representative.

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• Will cut installation costs on every job. These fittings employ a time-tested principle in a new and scientific manner which cuts down installing time. They work easily in hard-to-get-at places, and make a better looking job at lower cost.

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HANDIER

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TRADE MARK REGISTERED

A MARK OF QUALITY

KWIKON COMPANY

626 W. JACKSON BLVD.

CHICAGO

Questions on the Code

[FROM PAGE 59]

Limit on Parkway Cable

Q. *"We will appreciate your giving us the limitations for using non-metallic parkway cable for service entrances, also the limitations on full-metallic parkway cable for service entrances.—E.F.H."*

A. Parkway Cable is a cable designed for use only underground along parkways where, of course, there are no fire hazards. It is not being submitted to, nor approved by Underwriters' Laboratories. Our correspondent evidently has reference to Service Entrance Cable which we will discuss below.

There are two classes of service cable.—

1. Service Drop Cable, 2. Service Entrance Cable.

The Service Drop Cable is of one type.—

Type S. D.—and intended to be used only from the pole overhead to the service head on the building. However, it could be used in service entrance work above ground down the side of a house, if run in conduit or electrical metallic tubing.

The Service Entrance Cable is divided into 3 types as follows,—

Type S. E., for use above ground where not subject to mechanical disturbance.

Type A. S. E. for use above ground where it is liable to suffer any mechanical disturbance.

Type U. S. E. for use underground.

Where the service entrance cable would be subject to mechanical disturbance, there should be used either Type S. E. cable in conduit or Type A. S. E. cable. But Types S. E. or A. S. E., even if in conduit, could not be used for underground work. There, we should use Type U. S. E. cable or lead covered wires in conduit.

Types S. E. and A. S. E. cable may be used for interior wiring, if all the conductors are fully insulated, except that for range circuits only the so-called "bare neutral" type of entrance cable may be used, provided the cable has a final non-metallic outer covering for protection.

As to the metallic or non-metallic cables, all three types—S. E., A. S. E., or U. S. E.—may or may not have a metallic armor. The armor is not a deciding point as to the use of the cable. We must go entirely by which type cable is approved.

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HAZARD INSULATED WIRE WORKS

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Factories: Wilkes-Barre, Pa. Passaic, N. J.

WE STILL MAINTAIN OUR ORIGINAL POLICY OF SELLING THESE TAPES THROUGH LEGITIMATE WHOLESALERS ONLY.

Questions on Signalling

Answered by
ALBERT A. SCHUHLER

Annunciators in Multiple

Q. *What type of annunciators are recommended for multiple operation, and why?*—H.S.

A. Generally speaking, the electrical resent drop type annunciator is preferable for operation in multiple, because all annunciators may be reset at any annunciator or from any remote location. The gravity, hand reset, drop type annunciator is sometimes used in multiple circuits. However, this type of annunciator is not practical for such service, because it is necessary to reset each annunciator individually, by manually operating the reset lever or plunger. This is inconvenient, where annunciators are located far apart.

Lamp annunciators may also be used in multiple circuits. These are especially recommended where indications are to be read from a distance. These annunciators may also be reset from many different points, in the same manner as electric reset annunciators.

Burglar Alarm Lock Switches

Q. *What method is followed in connecting lock type alarm switches in open and closed-circuit burglar alarm systems?*—O.T.

A. In open-circuit systems, the lock switch is connected in series with the burglar alarm contact spring at the door to be so equipped. Operation of the lock opens the circuit to the contact spring, and therefore, the circuit at this point becomes inoperative. In this position one may enter without operating the alarm signal. Returning the lock to its original status by turning the key, again closes this part of the circuit, so that the contact spring will function as intended.

In closed-circuit systems, the lock switch is connected in multiple with the burglar alarm contact spring at the door. Operation of the lock closes the circuit around, or in shunt with, the contact spring. In this position, when the door is opened, while the contacts open, the shunt circuit closes the circuit at this point and keeps the entire burglar alarm circuit intact. Turning the lock to its original position again, opens the circuit across the contact spring.

Tank Alarm with Pilot Lights

Q. *We wish to install a simple low-voltage "high" and "low" tank alarm, for use in connection with an industrial process. It will be necessary to have a visual signal to indicate whether the liquid in the tank is "high" or "low". This signal should stay on until the liquid begins to fall or to rise as the case may be. In addition, an audible signal is needed to attract the attention of the attendant. How can we accomplish this?*—G. H.

A. The simplest form of "high" and "low" tank alarm system consists of a float switch with "high and "low" circuit contacts, a manually operated throw-over switch, an alarm bell common to both "high" and "low" alarms, and two pilot lamps to indicate the position of the float switch. The circuit of such an alarm system is shown.

When the tank is filled, the float is up, and the "high" contact H, of the tank switch, completes the circuit to pilot lamp H, and to the alarm bell. When this alarm is given, the throw-over switch, which is of the single-pole double-throw type, is placed in the "low" position L. This causes the bell to stop ringing, but the lamp H, remains illuminated until the contact H, breaks. This will happen as soon as there is a small drop in the height of the liquid. When the liquid in the tank is low, the "low" contact L, of the tank switch closes the circuit to the pilot lamp L, and also to the bell. The switch is then placed in the "high" position to receive the next "high" signal and to disconnect the bell signal on the "low" alarm.

Connectors for Portable Equipment

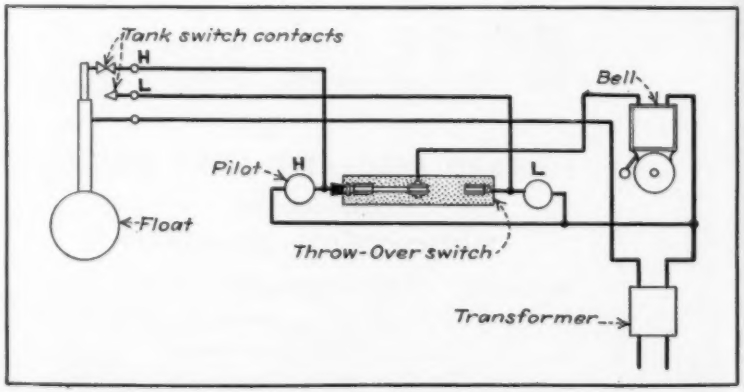
Q. *We have a remodelling job, which requires rearrangement of the wiring leading into a desk, having a considerable number of low-tension signaling devices.*

It is necessary that we replace the present permanent wiring between this desk and a terminal box, with a flexible cable. It has come to our attention that an arrangement may be found to readily connect and disconnect all wires should the occasion arise.

What standard or semi-standard device may be used to accomplish this result? What particular advantages are derived by using such a device? —*A.P.M.*

A. The use of separable connectors in new, old, remodeling and maintenance work in the signaling field is becoming greatly recognized and therefore should be considered in your case.

Ordinarily, most annunciators, directory pads, buzzers, pilot lights and telephones placed on desks, are connected directly to the stationary or permanent wiring by means of splices. While the first cost may be slightly lower in



TANK HOOK-UP—*Simple system for wiring a tank alarm with pilot light.*

THE SUCCESS OF YOUR BUSINESS DEPENDS ON THE USE OF GOOD INSULATING MATERIALS

That is why you should use only G-E Insulating Materials and have an eye on those extra profits and the increased business which G-E materials help you get through building up a reputation for quality and dependability.

If you are not using G-E Insulating Materials, why not try them? They cost no more than ordinary materials but you get that extra large margin of quality. Use G-E Insulating Materials for dependability and extra profits.

There is a G-E Merchandise Distributor nearby who will be pleased to serve you, or write Section M-889, Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn., for complete information.

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Two Popular Sales

Use these two free books in talking rewiring problems with industrial plant owners

"These books are an immense help in making recommendations to plant owners." —an electrical contractor

"An excellent plan to develop sales." —an electrical wholesaler

"Fine material—it's making business for us." —an electrical contractor

THE statements quoted above are typical of many we have received from persons in the electrical industry. They show that the two free books shown here are of real value. They "open the door" to profitable wiring contracts.

Why don't you get these books and use them in your selling? The "Industrial Wiring Survey" tells how to initiate a scientific check-up of electrical circuits. It enables you to get the industrial plant manager to *do something* about rewiring.

The "Industrial Guide for the Selection of Wire & Cable" tells how to correct situations revealed by the survey. It is the only book of its kind in the electrical industry! Together, these two books give you a definite program to present to the plant owner.

Right now the stage is set for action. In ads in national magazines like the one shown here, we are telling the industrial executive: "Modernize antiquated electric circuits." Estimates reveal that 9 out of 10 industrial plants today are losing money needlessly through faulty wiring.

By telling the executive how to save, you promote the sale of modern equipment. Join in this campaign, as so many other contractors and wholesalers are doing. The first step is to send for these free books. Use the convenient coupon at right.

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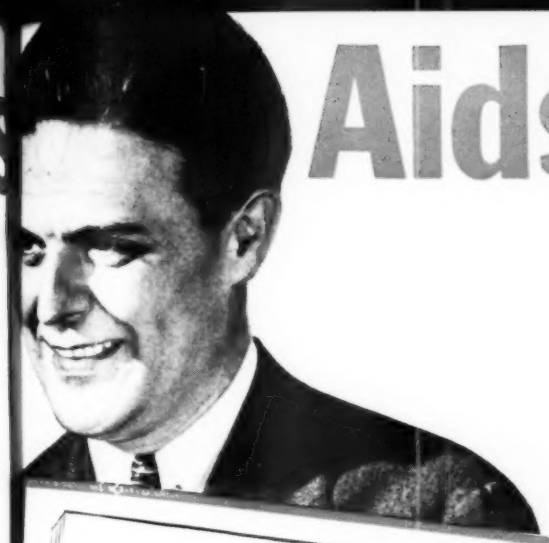

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MODERNIZED WIRING AIDS PLANT OPERATION IN THESE SIX WAYS

1 Prevents breakdowns that retard production and cause labor to lose wages.

2 Prevents light losses and slowing down of machines due to voltage drop.

3 Prevents dissipation of power in the form of invisible heat losses.

4 Lowers maintenance and repair costs.

5 Permits shifting of equipment or installation of new machinery with minimum delay.

6 Protects safety of workers and lowers insurance rates—a permanent saving!

Old-fashioned, "hit or miss" wiring is wasting power in nine out of ten factories, estimates reveal. Bring your plant's electric circuits up to date before a breakdown occurs. A wiring survey will cost you nothing.

HAVE you perhaps invested thousands of dollars in new, improved electrical equipment on left untouched the circuits upon which successful operation of the new machines depends?

Too often, the new added equipment *increases still more* the dollar waste of old-fashioned, deficient electric wiring! *Estimates reveal that in 9 out of 10 industrial plants, today this waste exists.*

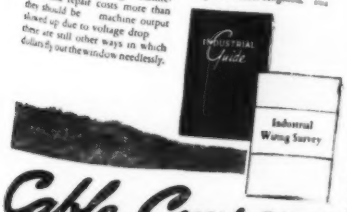
How dollars fly out the window needlessly

Overloaded circuits lead to breakdowns. Men and machines stand idle ... production is stopped ... until repairs are made. Or the loss from antiquated circuits may take another form: Power is squandered through heat losses. It evaporates—invisibly ... only the treasurer *wondering* why current bills are so high! Maintenance and repair costs more than they should be ... machine output slowed up due to voltage drop ... there are still other ways in which dollars fly out the window needlessly.

Safeguard your plant against these dangers

To aid you in discovering and preventing breakdowns ... to enable you to stop hidden losses ... we have prepared two useful books. One is our Industrial Wiring Survey. "This volume tells you how to find out what's wrong with electric wiring on your plant. The other volume is our 'Industrial Guide for the Selection of Wire and Cable.' Brand new, it is the only thing of its kind in the electrical industry. It tells you how to correct the troubles which a check-up of circuits reveals.

Write for these books. Then put the matter of a survey up to your electrical engineer, industrial consultant, or electrical contractor. If you have a specific problem, consult our Engineering Department. We will cooperate without obligation. ... ...



Napoleon maneuvered his troops and those of Ragusa in preparation for battle outside the city walls. The threat alone might sway the Allies to favor Napoleon's son.

When Caulaincourt arrived at Essonnes, he found Ragusa acting queerly. An emissary from the Allied field headquarters nearby had arrived at the same moment. Puzzled, Caulaincourt ran down to the courtyard to see about getting through the Allied lines, found when he returned that the miserable Ragusa out of his sight. Caulaincourt dragged him to Alexander. Until five in the morning Napoleon's emissaries argued with that odd Tsar, who was in his most mellow mood. He encouraged them. Napoleon's cause still had a chance. But all precautions were futile, for at eleven-thirty in the morning when Caulaincourt was having breakfast with Marshal Ney, Ragusa suddenly burst in, stupefied them by jabbering incoherently that he was disgraced. All night long his troops had been going over to the enemy. Betrayed by Ragusa's staff, the soldiers had thought they were going into battle.

In his long-lost memoirs,* Caulaincourt cleared up a major Napoleonic mystery with his account of Ragusa's treachery, clarified another with his account of Napoleon's attempted suicide a week later. Last year the first volume of this extraordinary document was offered U. S. readers under the title *With Napoleon in Russia*. Last week the second and concluding volume retraced the stages of the Emperor's decline to the time of his departure for Elba. Together the two books constitute an amazing picture of the smashing of a world power, the first volume more readable as a connected narrative, the second more notable for its explicit records of events over which historians have speculated endlessly. A stoic, melancholy spirit, Caulaincourt was a strange combination himself, a blunt, hard-riding man of action who was also a fatalist and a philosopher, and who wrote with classic severity.

So outspoken he often exasperated Napoleon, Caulaincourt had opposed the war with Russia, refused to flatter his Emperor, so that, although the Corsican tormented his General, Napoleon also had a nervous desire for his praise and a respect for his honesty. This feeling deepened as Napoleon went down, until on the night of his attempted suicide he poured out his story to Caulaincourt alone while the sweat broke out on his sunken features and he wanted for the poison to take effect. The poison was opium, belladonna and white hellebore. Napoleon's stomach rejected it, and in place of the dignified Roman death he had courted, he spent the night vomiting, begging Caulaincourt to give him another potion, spouting out his disconnected, feverish explanations of his rise and fall. Ending with this bitter scene, Caulaincourt's memoirs have an almost symphonic symmetry. They begin at the moment of the Empire's greatest strength and trace its collapse in the sheet of defeats, treacheries, frustrations, missed chances, which followed one another faster than the imagination could encompass

ANACONDA

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Anaconda Wire and Cable Company, 25 Broadway, N. Y. C.
Please send copy of your new "Industrial Guide." Also copy of your "Wiring Survey." (If you already have one of these books, check the one wanted.)

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FOR
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BIG PROFITS

This new 690 series has gone ahead in a big way—contractors are finding it exactly right for building floodlighting sales.

The ALZAK projector delivers a longer, broader beam—without streaks or striations and the aluminum wire-enclosing bracket puts the light just where you want it—with only one bolt to tighten.

Designed for 750, 1000, and 1500 watt lamps. Reflector size 19½" by 26½".

The New Type J Bracket has a 40 deg. vertical adjustment, 20 deg. up and 20 deg. down, and in addition, for the first time, a horizontal swing of 180 deg. without moving the bracket. It fully encloses the wire. Write for details.

QUADRANGLE MFG. CO.
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Questions on Signaling

[FROM PAGE 62]

following this type of an installation, it often becomes costly later on.

Separable connectors are made in a number of forms, and may be applied in many ways. Primarily, they are designed to effect an electrical and a mechanical connection between the terminals of a permanent wiring system (whether it be a cable or made up of individual wires) and a portable wiring system, which usually terminates in some low-tension apparatus.

The advantages of separable connectors are:

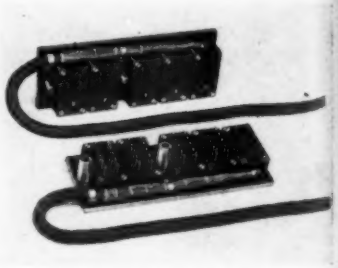

FIG. 1—Several 10 point connectors grouped for convenience.

FIG. 2—Separable connectors are found behind an organ console.

(1) Saves time and labor by eliminating splicing, soldering and taping.
(2) Ease in connecting and disconnecting as screw terminals are used.
(3) Ease in testing wiring and apparatus without disturbing the permanent wiring.
(4) Ease in identifying, wires as terminals are marked and wires are connected to terminals in same relative positions throughout.
(5) Smaller apparatus, such as directory pads, buzzers and pilot lights may be removed for repair. Another interchangeable unit may be immediately connected in its place, to reduce the time in interruption to this part of the system.

Get the Best Mercury Lamp Illumination Efficiencies with Time-Proven Transformers

● Mercury lamps, to give trouble-free, dependable performance require an accurately designed transformer to govern the current and supply the correct starting and operating voltages.

Jefferson Mercury Lamp Transformers insure continuous satisfactory operation because of their liberal design and careful construction.

Besides, they have these definite advantages and features:

- Cool
- Quiet
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- Neat and compact
- Roomy wiring compartments
- Facilities for mounting in any position
- Combination wall mounting and fixture suspension unit
- Provided with clamps for messenger wire support.

Jefferson Mercury Lamp Transformers are fully described in new Bulletin 371-ML. JEFFERSON ELECTRIC COMPANY, Bellwood (Suburb of Chicago), Illinois. Canadian Factory, 535 College Street, Toronto.

Write for New Bulletin 371-ML.

JEFFERSON
Mercury Lamp
TRANSFORMERS

UMI

An electrical man named O'Toole
Wanted lugs that would stay good and cool.
On wire or cable
He always was able
To make Burndy Qiklugs his rule.

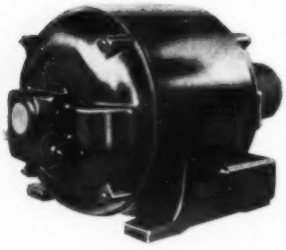
BURNDY QIKLUG — type QA — installed with the turn of a wrench. Eliminates trouble, expense, hazards of soldering. Stocked in sizes up to 2000 Mcm. Salvable for re-use.

BURNDY

ENGINEERING COMPANY, INC. • 459 E. 133d ST., NEW YORK, N. Y.

STOP!

You can't do better than replace those worn out motors with Peerless



Sure — if the motor you are repairing can be repaired economically — do it.

But when repairing is not advisable — get a Peerless.

Peerless motors have dependability — ruggedness and long life. 44 years in building quality electrical equipment is the reason you can assure your customer that Peerless motors will give satisfactory performance and long, trouble-free operation.

THE *Peerless* ELECTRIC CO.
WARREN, OHIO

Questions on Signalling

[FROM PAGE 44]

(6) Larger apparatus, such as annunciators and switchboards may be removed for repairs without disturbing the permanent wiring. And most sections of these units may be repaired immediately, without placing the entire apparatus out of commission.
(7) All wiring and connections in the connectors are protected in substantial metal housings and are thoroughly insulated against possible grounds.
(8) May be connected directly to floor conduits, underfloor ducts, floor boxes, flush, surface or portable wiring.

The accompanying illustrations show to what extent these separable connectors may be used. The problem involved was to quickly connect or disconnect an organ console used in the grand ballroom of the Waldorf Astoria Hotel in New York City, so that it might be removed when and if desired. Fig. 1 shows the grouping of several tenpoint connectors for convenience in handling. Fig. 2 shows the arrangement of the several groups in the rear of the organ console.

Preventing Lamp Failure

Q. *What method is followed in connecting lamps in important signal systems, to be reasonably certain that a signal lamp will indicate an alarm or other emergency call at any time?—L. W.*

A. One method of preventing lamp failure in hospital, hold-up, burglar alarm and watchman signal systems is to connect two lamps in multiple, in pilot stations and annunciator indicator compartments. Where pilot stations are used, two lamps may be connected in multiple and placed on opposite sides of a barrier or separator. In this case, when both lamps are in good condition, the entire pilot dome is illuminated. On the other hand, should one lamp burn out, only one-half of the pilot dome is illuminated, and it is an easy matter to locate the lamp which requires replacement.

In annunciators, the barrier method may also be used and is preferred. However, even without a barrier, the difference in the intensity of the light behind the indication is quite noticeable, and if properly supervised, defective lamps may be readily detected.

FOR COMMERCIAL CUSTOMERS WHO COUNT THE COST

Especially adapted for installation in modern Specialty Shops, Westinghouse TI Luminaires are designed to suit the business needs of Commercial proprietors . . . because they are so thoroughly suited to the taste and comfort of *their* customers.

TI·500 ★ TI·1000

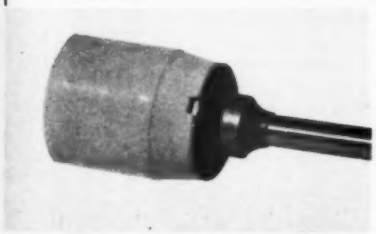
TOTALLY INDIRECT LUMINAIRES

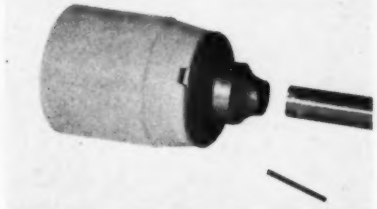
Like many other contractor-dealers who handle lighting equipment, you too may have felt the need for a quality lighting unit of the totally indirect type that your Commercial customers could afford!

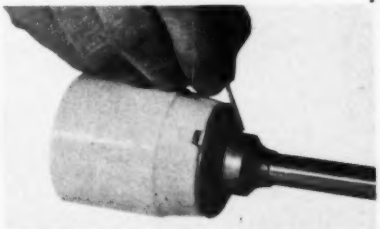
Now you have it in the new Westinghouse TI models. Designed for modern Commercial interiors . . . in shops, offices, schools and for similar applications . . . this unit is just as good as it looks. Moreover, it is easier than most units to install, because of a simplified device for shortening hanger lengths on the job, as illustrated below.

Right on the verge of your autumn-season peak, now is the time to stock equipment that you can sell at a profit to Commercial establishments. Ask your nearest Westinghouse Jobber for complete details; or write directly to the Westinghouse Electric & Manufacturing Co., Lighting Division, Edgewater Park Cleveland, Ohio.

SIMPLIFIED DEVICE FOR SHORTENING HANGER LENGTHS RIGHT ON THE JOB







The socket does not screw into the stem; but merely slides over the end, and is rigidly held in place by a slip pin. To shorten, you simply pull the pin and the two pieces come apart.

All you need is a hack saw and a hand drill. After the two pieces are separated, you cut the hanger to proper length; then drill a hole for the slip pin at the end.

To complete this simple operation, you merely pull the socket wire through the hanger, slide the socket assembly over the stem, and lock the two together with the slip pin.

WHEN YOU THINK OF *Lighting* THINK OF

Westinghouse

In the News

FARM WIRING GETS A LIFT

Guesswork, confusion and chiselling will be greatly relieved for the farmer who has to arrange for electrification, under the recently announced Manual of Wiring & Plumbing Procedures issued by the Rural Electrification Administration. The wiring problem is clarified through a four-fold schedule. The manual provides—(1) Suggested unit prices for preliminary estimates and loan applications, (2) Brief specifications to bidders and installers of farm wiring, (3) Definite requirement of inspection and the furnishing of certificates from qualified sources, and (4) Minimum installation standards, requiring that approved types of materials be used, fixing responsibility for workmanship, the contractor to secure a statement of satisfaction from the owner.

To help the farmer determine the approximate loan needed to cover farmstead wiring, this schedule of tentative prices has been included—

Total number of outlets, such as ceiling, bracket, service receptacle, switch, barn outlets, hen house lights, incubator and brooder outlets, @ $2.50 per outlet.

Special Outlets—heavy duty appliances, electric range, heating devices, etc., @ $8 per outlet.

Motor outlets, @ $5.

25-yard pole, @ $10.

Interbuilding Wiring, @ 7¢ per line foot.

Service extensions beyond limit allowed in Line Construction Contract, @ 10¢ per line foot.

The National Electrical Code and existing local or state laws are established as the basis for all rural installations made under the REA plan for financing farm wiring. In addition there are specific minimum requirements as follows—

Main Service Entrances—Minimum size No. 8, clearance of 5 ft. from doors and windows, and not less than 12 ft. above the ground level.

Outbuilding Service Entrances—Must extend up on inside of building to a point not less than 12 ft. above the outside ground level. Approved service heads, brackets and other accessories required. Each service must be grounded.

Outside Wires Between Buildings—Minimum size No. 10 weather-proof, limited to 50-ft. spans. For longer spans, No. 8 or larger conductors required.

Distribution Panels—Main panels must have provisions for 2 spare circuits. For two-story houses of more than six rooms, the upper floors shall have separate branch load centers, with not less than two No. 10 feeders.

Branch Circuits—Light and general convenience outlets may use No. 14 circuits, but No. 12 required for all refrigerator, electric iron, washing machine, and similar convenience outlets.

Over Current Protection—15 amp. for general circuits; 20 amp. for appliance circuits; 50 amp. for ranges; 30 or 60 amp. for water heaters, according to wattage rating.

Voltage Drop—Wire sizes must be employed to guarantee not greater than three percent voltage drop on 80 percent load factor at outlets other than motors. Outbuilding circuits supplying more than one motor shall not have more than five percent drop at 80 percent load factor, while at any individual motor the voltage drop shall not exceed 5 percent at 125 percent load factor.

Methods of Wiring—Non-metallic sheathed cable or conduit, run exposed, is optional for outbuildings, and conduit is required in haymows. In residences no particular method is specified except that surface metal raceway is suggested where exposed work is necessary.

Yard Lights are to be complete with gooseneck, 12-in. steel reflector, and two three-way weather-proof switch controls.

A Word from Washington

War on amateur farm and home wiring jobs has been declared by Rural Electrification Authority. New projects must agree that every job along their lines must be inspected—must comply with a set of rigid specifications just issued.

In states that have no regular inspection service REA proposes a new plan to the state fire marshals. It will be under REA supervision, and the organizations that borrow money for new distribution systems will be responsible.

Inspectors must be appointed in states now lacking a regular inspection service. New appointees must know something about wiring and electricity to start with and will be trained.

Wiring jobs which comply with the new specifications will be approved. Any job that fails to comply with these specifications must be done over again.

No REA approved inspection —no cash!

Meanwhile all REA borrowers have been sent copies of a "Manual of Wiring and Plumbing Procedures", from now on the official guide—

CARTER FIELD,
Washington Bureau,
McGraw-Hill Publications

Some of the Manual requirements establish worthwhile minimum standards that will lift farm wiring to a higher plane than has been practiced. However, in attempting to lift general requirements from the Code and apply them specifically to farm installations, there is evidence of haste and lack of consideration. In requiring definite types of material for outbuildings, other common wiring methods appear to have

"I let that young Smith boy wire the farm, maw. He's got an electric engine and knows all about these things."

FLOODLIGHT OF THE MONTH

General-Utility Floodlight

Type L-43
750/1000 Watts

No. 5 of a series to acquaint you with G-E floodlights to help you increase your profits

THIS FLOODLIGHT WILL BOOST YOUR PROFITS

A simple, low-cost floodlight with the efficiency and adaptability that enable you to satisfy the floodlighting requirements of gas stations, parking lots, signboards, and roadside markets. Countless other building and ground-area floodlighting projects can be handled easily and inexpensively with this unit. Industrial applications include storage yards, gates, loading platforms, driveways, and many others.

Floodlighting jobs, even small ones, are worthwhile. They involve, in addition to labor, a quantity of lamps, wiring supplies, cable, and perhaps time switches, as well as floodlights, which make the total return attractive. The nearest General Electric sales office or branch of the General Electric Supply Corporation will gladly help you work out the specific requirements for any job.

SIMPLE, STURDY CONSTRUCTION

The reflector is the high-efficiency, long-lasting Alzak aluminum. Support and cover are die-cast aluminum. Mounting attachments shown below are galvanized malleable and cast iron. Four feet of insulated cable included with each unit. May be used either open or enclosed.

EFFICIENT PERFORMANCE

Lamp	Reflector	Beam Angle	Beam Lumens	
			750 watts	1000 watts
Clear	Polished	28°	5050	7218
Inside Frosted	Polished	55°	5880	8400
Clear	Etched	55°	5490	7840
Inside Frosted	Etched	100°	7680	10970

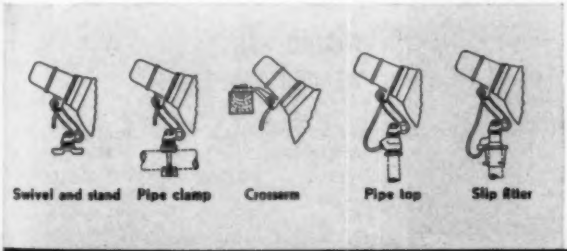
Data for floodlight with plain clear door glass. For open type add about 10 per cent to lumens output

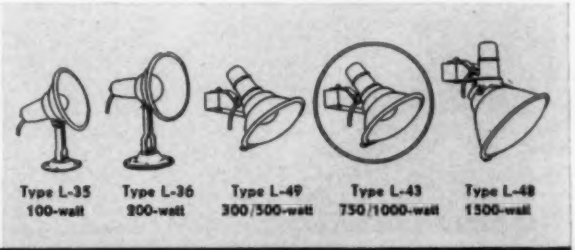
LOW PRICE

Open-type floodlight with etched reflector, $22; with polished reflector, $28. Enclosed type with clear glass and retaining ring, add $11.

All above include crossarm bracket mounting. Other mountings at small additional charge.

All prices are list including freight charges.





500-219

GENERAL ELECTRIC

In the News

[FROM PAGE 70]

been excluded from use. There has been no attempt to specify alternate choices of service entrance materials or types of interior wiring materials. There are general requirements for various wiring devices to be used for local switches, convenience receptacles, plates, range and motor outlets. Specific requirements are made for completing various outlets for the connection of lighting fixtures, and for special equipment to be installed by others.

For planning adequate service switch and conductor capacities, range and motor circuits, these specifications provide no suggestion as to actual wire and switch ratings to be used. Here the farmer and installer remain dependent upon the correctness of voltage drop calculations.

UNDERWRITERS EXPAND PLANTS

Work has begun on an addition to the principal office and testing station of Underwriters' Laboratories, Inc., at 207 E. Ohio St., Chicago. Plans call for a fourth and fifth floor facing Ohio Street, centrally spaced with a 166-ft. frontage, and providing about 10,000 square feet additional floor space.

On the West Coast the premises at 615 Commercial St., San Francisco, occupied for the last fourteen years, are no longer suitable for handling the greatly increased amount of electrical laboratory work. New quarters on the eighth floor at 500 Sansome St., will be ready and in service about September first.

LICENSE BOARD REELECTS BUTCHER

Roy M. Butcher, Electrical Contractor of San Jose, California, was reelected chairman of the Contractors' State License Board for the State of California at the annual meeting of the Board in San Diego, July 23. In its meeting the License Board also began the preparation of rules for the prequalification of applicants for contractors' license according to the terms of the amendment to the law passed by the last legislature.

CURRENT RATINGS FOR FLEXIBLE CORDS

The new National Electrical Code will contain a change in the current ratings of flexible cords.

Since the time the first table of current ratings was prepared back in 1899, rubber insulated wires of 18-gauge have been approved or safe for a maximum safe load of 3 amperes, and the maximum current rating of 16-gauge wires was set at 5 amperes. Flexible cords took these same ratings. The ratings of 18 and 16-gauge rubber-insulated flexible cords (but not other wires) are now being changed to 5 amperes and 7 amperes respectively.

These increased ratings apply, of course, only to cords which are made with the full gauge-size conductors.

ROLLING ALONG FOR REA—Midwestern methods of doing business recently reached a new high, with the introduction of trailers for the use of field electrical engineers. Roy W. Chanaberry, Inc., of Louisville needed mobility with comfort for engineers engaged in planning and supervising a number of projects in Kentucky for the Rural Electrification Administration. (C. O. Schupp, draughtsman-engineer for the Chanaberry organization, is shown above checking blueprints while out on a project.) The trailer carries a message which should impress future rural customers along the right-of-way.

COMING MEETINGS

International Association of Electrical Inspectors—Eastern Section, Hartford, Conn., Sept. 20-22.
Western Section, Chicago, Ill., Sept. 20-22.
Southern Section, Atlanta, Ga., Week of October 4.

Illuminating Engineering Society — Annual Convention, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 27-30.

Ohio Electrical Contractors Association, Inc.—Annual meeting, Cleveland, Ohio, week of October 3.

International Association of Electrical Leagues — Annual Convention, New York, N. Y., October 6 and 7.

National Electrical Contractors Association — Annual convention, Biltmore Hotel, Los Angeles, Calif., October 18-21.

American Welding Society — Annual Meeting and Welding Exposition. Atlantic City, N. J., October 18-22.

Electrical Maintenance Engineers — Annual Show, Lighting Institute, Chicago, Ill., Oct. 20-22, 1937.

MOTOR SHOP GROUP TO EXPAND

Since NECA recently discontinued collecting dues from its membership for motor repair or rewinding business, the National Industrial Service Association has circularized all members of the NECA motor section. A general letter from Wm. J. Wheeler, president of NISA, calls attention to NECA's action, and invites members of the NECA Motor Section to share in the responsibilities and benefits of NISA by taking out membership. An informational questionnaire attached to President Wheeler's letter explains the history of NISA, eligibility for membership, principal objectives, formation of local chapters and the details of applying for membership. An attached application for membership shows dues as being based on the average number of persons employed during the preceding year. Dues range from Class "A," employers of from one to six persons at $10 per year up to Class "E", employers of over 35 persons who pay $50 per year. NISA headquarters are at 500 Fifth Avenue, Suite 2030, New York, N. Y.

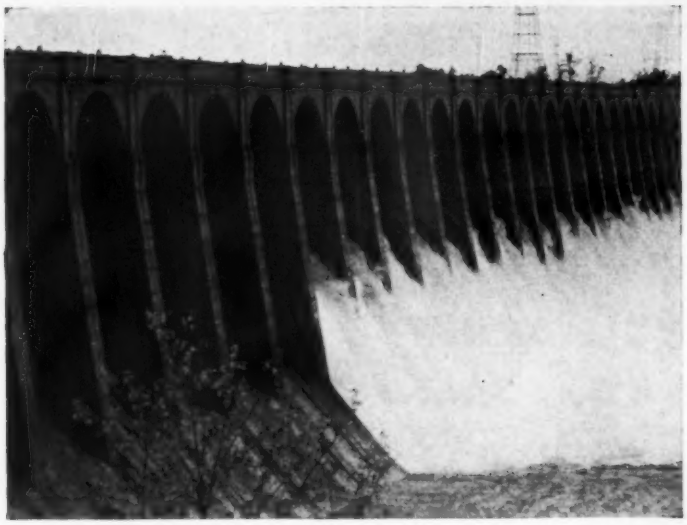
A united program will be directed by these two groups to unaffiliated shops who are eligible to NISA membership.

WIRING FOR WELDED BUILDINGS

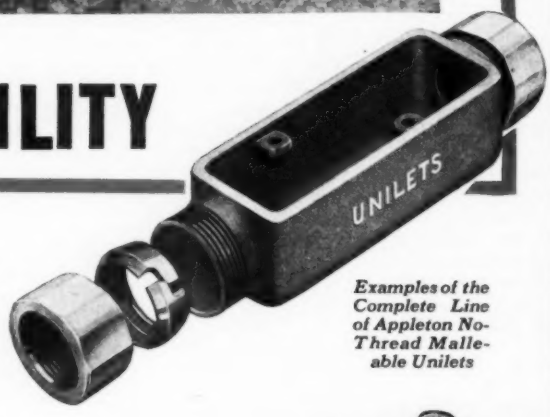
Electrical work looms larger for Manhattan's future structures after New York City's new building code becomes effective on January 1, 1938. The new code permits the use of welding, in place of rivetting, in steel construction. Thus, besides the usual job of temporary wiring done on buildings under construction for hoists, stairway and work lights, electric arc welding contractors will also require feeders run to their equipment, as work moves upward with steel erection operations.

According to an announcement by the

BUILDER
IT'S THE GADGETS THAT SELL HOMES TO-DAY — BETTER INSTALL THE P&S-DESPARD LINE
ARCHITECT
THIS CONTRACT CALLS FOR FULL COMFORT WIRING SO I'VE SPECIFIED P&S-DESPARD WIRING DEVICES
For
TODAY'S MARKET
you need Wiring Devices
for 2 types of jobs
THE SPECULATIVE JOB
For the price job—the P&S-Despard Line holds many unusual advantages—conveniences such as pilot lights—night lights—radio outlets, etc. can be assembled into inexpensive combinations RIGHT ON THE JOB. Switches too—are most important, and in the P&S-Despard Line you have a switch that is reliable—and—its multi-ganging feature makes it competitive with even the lowest in price. Then again, the entire installation may be completed with economical single gang plates presenting a modern, smart-appearing job that adds salability to the home.
THE SPECIFICATION JOB
For the quality job—there's nothing quite like the P&S-Despard Line—any desired electrical convenience—no matter how unusual may be easily and quickly assembled—specification features such as two circuit receptacles—path of light control—three and four way switches—bell pushes, etc. are more modernly installed the P&S-Despard way—then too—these additional features do not require large multi-gang installations—in most instances they can be combined under a single gang plate.
You can get both jobs with the
P&S-DESPARD LINE
STOCK PROBLEM SIMPLIFIED
A HANDFUL OF DEVICES WILL MAKE THESE P&S-DESPARD COMBINATIONS
PASS & SEYMOUR, INC. (Solvay Station) SYRACUSE, N. Y.



DURABILITY



Examples of the Complete Line of Appleton No-Thread Malleable Unilets

● PERMANENCE is of prime importance when a great dam like this is built to supply hydro-electric power. Every material is tested for *durability*. Appleton No-Thread Malleable Unilets are famous for this time-defying quality. There's no mystery about the source of the strength of these Unilets. They're cast of malleable iron, a material ideally suited for this type of fitting. Then the Unilets are coated with cadmium to effectively resist corrosion and rust for an age!

Appleton No-Thread Malleable Unilets are easily and quickly installed! You simply insert the conduit, tighten the nut and there it is. These Unilets are ideal for tight corners and cramped working space because *they're made to fit!*

This all-important quality of *long life* will stand you in good stead whether you're figuring on a canyon dam or a factory installation. Write for a free catalog showing the complete range of sizes.

Type "T" No-Thread Unilet

Type "C" No-Thread Unilet

Type "LL" No-Thread Unilet

No-Thread Coupling

Sold Through Wholesalers

APPLETON ELECTRIC COMPANY

1704 WELLINGTON AVENUE CHICAGO, U. S. A.

NEW YORK—76 Ninth Avenue
SAN FRANCISCO—655 Minna St.
LOS ANGELES—340 Azusa St.
DETROIT—7310 Woodward Ave.
ST. LOUIS—420 Frisco Building
ATLANTA—203 Luckie St., N.W.

APPLETON

No-Thread Malleable

The Original Threadless Conduit Fittings **UNILETS**

Reg. U. S. Pat. Off.

In the News

[FROM PAGE 73]

American Welding Society, silent steel construction, through the medium of welding will also result in savings in steel, because of simplification in design. Such savings may be expected to range from 4 to 10 per cent of the total steel used in the average building, and may run as high as 25 per cent in certain forms of trusses and plate girders.

MORE R.E.A. ALLOTMENTS

Rural Electrification Administration has announced these further allotments to build farm lines.

Indiana—$150,000 to Jay County Rural Electric Membership Corporation, Portland, to ultimately build 332 miles of line to serve 1,092 customers.

Iowa—$122,000 to the Hancock County Rural Electric Cooperative, Garner, to ultimately build 335 miles of line to serve 1,070 customers.

Minnesota—$125,000 to the Lake Region Cooperative Electric Assn., Fergus Falls, to ultimately build 231 miles of line to serve 618 customers.

Minnesota—$200,000 to the Rural Cooperative Power Assn., Minneapolis, to build a generating plant to serve REA financed projects in nine counties.

Colorado—$150,000 to the San Luis Valley Rural Electrification Company, Monte Vista, to ultimately build 345 miles of line to serve 800 customers.

Kentucky—$217,000 to a cooperative to be formed in Todd County, to ultimately build 412 miles of line to serve over 2,000 customers.

Iowa—$135,000 to the Calhoun County Rural Electric Cooperative, Rockwell City, to build a generating plant to serve several REA-financed projects in this section.

Illinois—$500,000 to the Eastern Illinois Power Cooperation, Watseka, to ultimately build 1,225 miles to serve 3,162 customers.

Michigan—$300,000 to the Southeastern Michigan Electric Cooperative, Inc., Adrian, to ultimately build 650 miles of line to serve 2,296 customers.

Minnesota—$109,000 to the Central Minnesota Cooperative Power Assn., Redwood Falls, to ultimately build 166 miles of line to serve about 600 customers in Redwood and Brown Counties.

Mississippi—$126,000 to the Yazoo Valley Electric Power Assn., Germania, Mississippi, to build 125 miles to serve 300 customers.

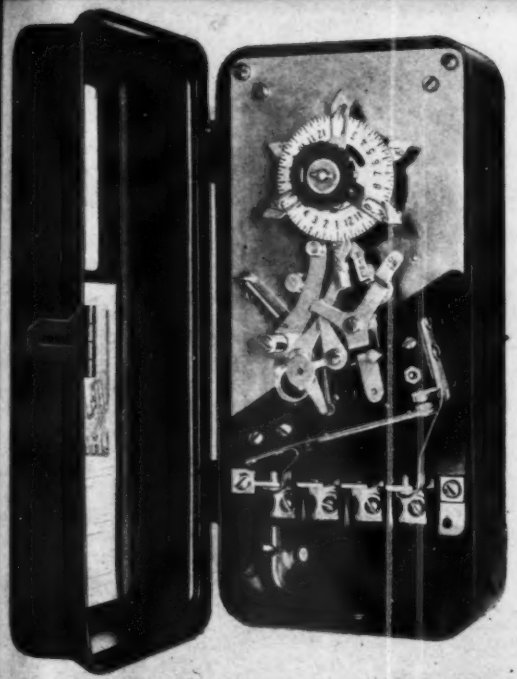
Wisconsin—$60,000 to the town of Bangor, to build an extension of 53 miles of line to its municipal system to serve 171 customers.

LOS ANGELES FORMS MORE UNION GROUPS

An association of union contractors within the Los Angeles Electrical Contractors Association is being organized through efforts both of the business agent of local No. 83 and of a special committee of the Los Angeles Association. This first group has been composed chiefly of the commercial operators doing large scale work. A second group of residential contractors is being organized on the same basis both by the union and the association committee. A fixture shop organization, also under union conditions, is likewise announced and manufacturers of switchboards, etc. are likewise feeling the effect of an A.F. of L. drive to unionize the electrical industry in Los Angeles.

THE UNSEEN HAND

Curtiz Lighting Photo



Sturdily built, simple in operation, self-starting, equipped with silver contacts—that's Form K Time-Switch

... that makes this installation

COMPLETELY AUTOMATIC

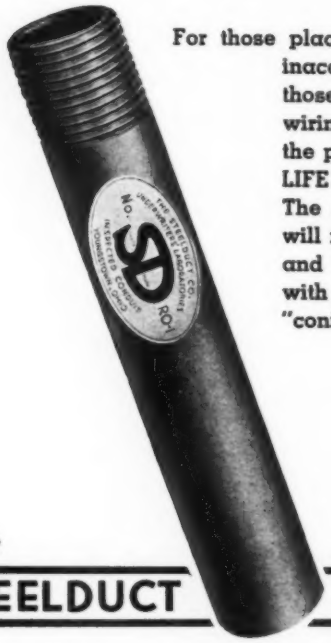
The keen merchandisers in department stores realize the value of modern display lighting. That makes them excellent prospects for Sangamo Time-Switches.

But . . . you must first sell them on the superior merits of the unseen hand: pure silver mechanical contacts . . . slow speed motor—less gear reduction . . . manual tripping without affecting subsequent operations . . . dust-proof case . . . more room for wiring. Besides, you are able to draw on the electrical wholesaler near you, who has a complete line of Sangamo Time-Switches for any specific job.

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

• PERFECT SAFETY IN UNSEEN PLACES

CONFIDENCE



For those places where conduit is practically inaccessible after installation . . . for those places where the bends and wiring system is complicated . . . for the places where conduit with LONG LIFE is imperative, use Steelduct. The absolute uniformity of Steelduct will make your estimates "come out" and you can bid with "confidence" with the product in which you have "confidence."

THE STEELDUCT CO. UNDERWRITERS' LABORATORIES No. SD RO-1 INSPECTED CONDUIT YOUNGSTOWN, OHIO

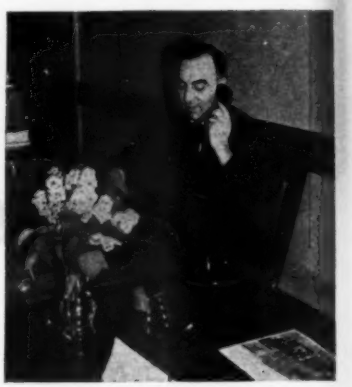
The
STEELDUCT COMPANY
YOUNGSTOWN, OHIO

Moving Day

After a complicated battery of printing presses with many control buttons were all hooked up with top-of-floor wiring, somebody decided they had to be moved around. So Richard C. Keeton of Bridgeport, Conn., began anew on another wiring order, warning the customer that a stubbed-up rewiring job would really have been a painful process.

Paying Stock

Beginning sixteen years ago to carry a representative stock of paper pulleys, Wingfield and Hundley of Richmond, Va., find this specialty justifies maintaining a regular stock worth about $900. This company carries sizes up to 12-in., also a large line of V-belts, pulleys and sheaves.

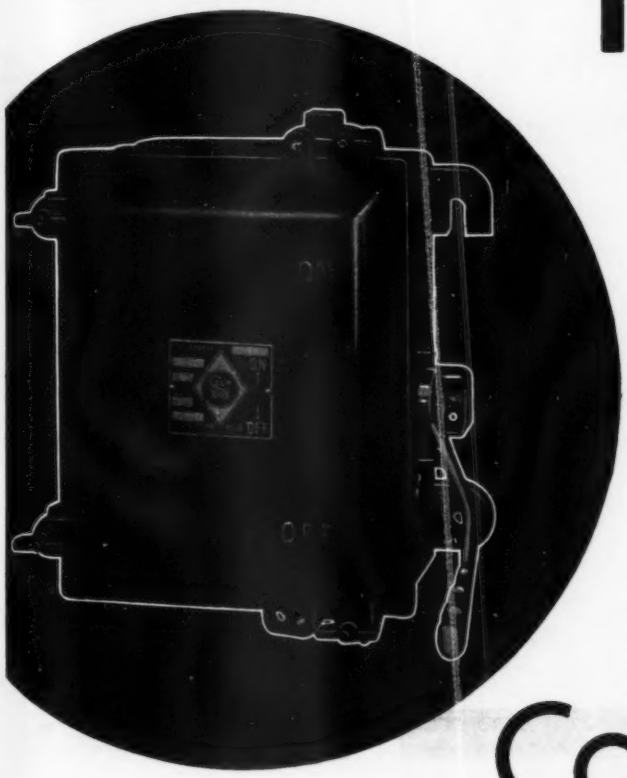


HE TELLS THEM—*Joseph D. Quinn, electrical contractor of Poughkeepsie, N. Y., lets the customer know when extra outlets will mean greater convenience. On a recent bank remodeling job he kept in close touch with the alterations. When a floor was torn up or a partition moved, he promptly told the owner about the opportunities for additional plug receptacles, switch controls or telephone outlets, while a concealed installation could be made economically. The result was a large number of additional conveniences for them and more profits from the job.*

Rejuvenated Junk

No old motors will be sold to junk dealers by the U. S. Electric Engineering Co., of Cleveland, says John Gross. Recently he sold some cripples for $15 each. The dealer painted the windings and altered the U. S. Co. invoice to read $75 and the motors were then sold for a $10 broker fee, as reconditioned U. S. surplus stock. When the motors failed John Gross got a black eye, so hereafter he will have no more bargains for the junk man.

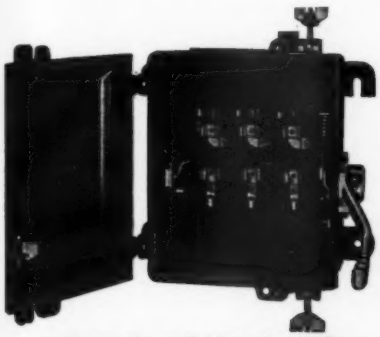
Built to TAME
the toughest job!



Dust, lint and water make life miserable for a Safety Switch . . . and so do steam and chemical vapors. It takes more than an ordinary switch to stand up under these conditions . . . and deliver dependable, trouble-free service year in and year out. But in these rugged Colt-Noark Weatherproof and Dust-tight switches you have a switch that is *designed* for just this type of abuse.

Next time you have a job that looks particularly tough, put in these hard-boiled Colt-Noarks . . . they'll tame it!

COLT NOARK
Dust Proof and Weatherproof Switches



Above is shown Catalog No. 99236, both open and closed. Note the rugged cabinet . . . the compact, simple construction of the switch unit . . . and the generous wiring space at both top and bottom.

AVAILABLE with fusible and non-fusible DUALBREAK mechanism . . . with quick-make, quick-break and interlocking covers. Either cast iron or cast aluminum cabinets . . . with covers securely fastened by extra heavy corrosion-proof eye-bolts and wing nuts. The metal handle operates in dust-tight bearings . . . and heavy rubber gaskets seal joints between the cover and the case. Tapped conduit holes are provided at top and bottom.

Heavy Duty Switch Mechanism . . . 230 and 575 Volts A. C. and 250 and 600 Volts D. C. Listed as standard by Underwriters' Laboratories, Inc. The mechanism is completely sealed . . . built for a lifetime of safe, dependable service. For full information write to

COLT'S PATENT FIRE ARMS MANUFACTURING CO.
ELECTRICAL DIVISION HARTFORD, CONN.
H. B. Squires Co., Pacific Coast Representative

100 Years of Manufacturing Experience is back of every Colt Built Product

COLT-NOARK

SWITCHES INDUSTRIAL CONTROL EQUIPMENT FUSES

Boston
New York
Chicago
Philadelphia

UMI

MORE BUSINESS

for Contractors . . . Better Jobs for Customers with

MULTI FLOODLIGHTS

More business is bound to come from featuring this Concealed Floodlight. It is ideal for intense lighting of near vertical areas such as walls of low buildings, or for distant illumination of ground areas such as ball parks, playgrounds, etc.

These units differ from the usual angle type reflector in that they are intended for high mounting and are constructed to divert the light downward. Furnished with different types of supporting brackets for mounting on wood or iron poles and walls. Get our catalog which gives complete details.

MULTI ELECTRIC MFG. COMPANY

1840 WEST 14th STREET.....CHICAGO, ILLINOIS

AFTER HOURS ★

After the rest of the force is gone, it is economy to burn only enough light for those still working. This means individual control of lights. And this means McGILL Levolier Switches. That is, if easy, positive operation and unusually long, trouble-free service are factors. Every Levolier Switch is made as carefully and accurately as a watch — and of finest materials. And every one is individually tested under full load before leaving the factory. Your wholesaler can supply you from stock.

A complete line, 3 to 10 amps. to meet every need in canopies, fixtures, conduit boxes. Also special switches and models for fractional h.p. motors.

McGILL *Levolier* SWITCHES

McGILL MANUFACTURING CO.
VALPARAISO, INDIANA
Box No. 670

Showmanship

An investment of $1,000 transformed the front part of Cutler & Cutler, Inc., offices at Portland, Me. into a neat and compact area for displaying a carefully selected group of lighting equipment. Shepard Cutler says it makes a dignified place for the architect and other clients to stop, and is therefore worth all it costs, regardless of whether direct sales are made.

Hazard Control

The city of Trenton, N. J., has no city inspection, but depends upon Underwriter service instead. However, Bert Robbins, inspector of wires and equipment for municipal buildings has found it possible to conduct reinspections in homes and stores through working out reports of electrical hazards for the fire department. The fire prevention officials have police power.

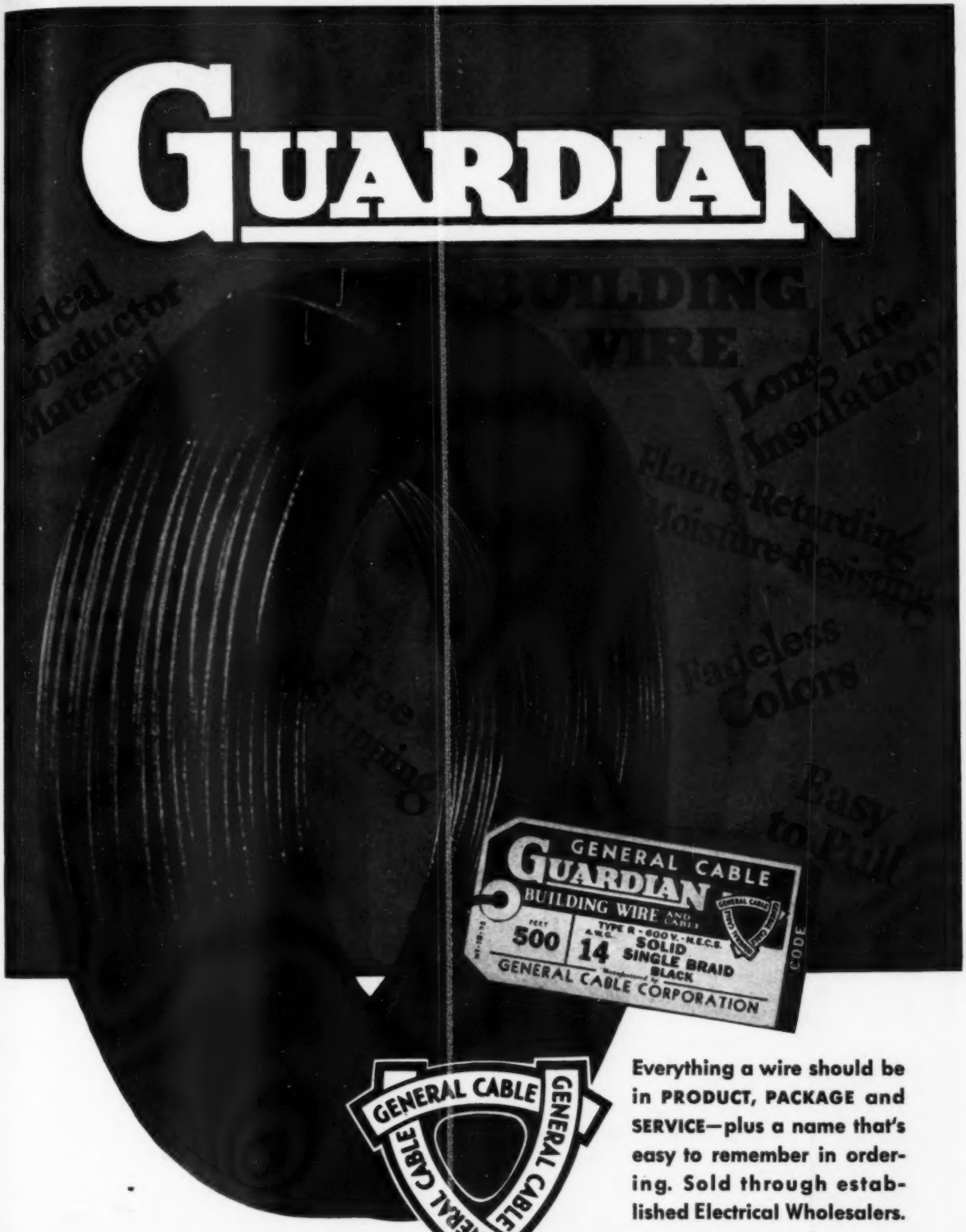
LONG ISLAND COMFORT — Here we see the 280th General Electric automatic furnace to be installed for William J. Levitt, Long Island builder. This one is in his 1937 Metropolitan Home. It was wired by William Berken, electrical contractor of Jamaica who specializes in home wiring for Levitt and other Long Island builders.

Lighting Stepped Up

An example of re-lighting possibilities for the contractor is cited by E. C. Carlson, Carlson Electric Co., of Youngstown, Ohio, in connection with two recent drafting room installations. In one case nine 200-watt fixtures were replaced with twenty-three 500's. In another, sixteen 200-watt fixtures were replaced with forty-five 500's. Also a local office building, built in 1928, has just been equipped with new feeders and panels to take care of modern lighting requirements.

UMI

GUARDIAN



GENERAL CABLE · GENERAL CABLE · GENERAL CABLE

Everything a wire should be in PRODUCT, PACKAGE and SERVICE—plus a name that's easy to remember in ordering. Sold through established Electrical Wholesalers.

GENERAL CABLE CORPORATION

Sales Offices: ATLANTA · BOSTON · BUFFALO · CHICAGO · CLEVELAND · DALLAS · DETROIT · LOS ANGELES
NEW YORK · PHILADELPHIA · PITTSBURGH · ROME · SAN FRANCISCO · ST LOUIS · SEATTLE · WASHINGTON D C

CONTRACTORS

Send your splicers to the job with

WATERBURY

UNIT PACKAGE SPLICES

and save money!

This sealed package contains all of the material and the correct quantity of each, for making a complete cable joint, either overhead or underground.

One purchase from one source instead of many from various sources—no waste of material—no waiting to assemble from delayed deliveries. Time out on the job for forgotten material is eliminated.

Your cost is known—not estimated.

Ask your nearest Graybar Branch or write to us direct.

WATERBURY CABLE SERVICE, INC.
253 Classon Ave., Brooklyn, N. Y.

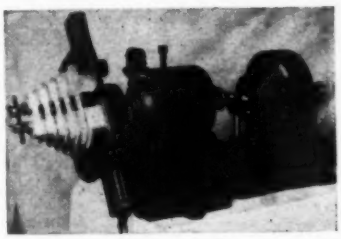
Distributed by Graybar

Only tested and approved materials used

IDEAL COIL WINDING HEAD AND DRIVE

MAKES BETTER COILS FASTER!

Simplifies winding of popular sized coils! Heads adjustable to any length or width in 5 to 10 minutes. Eliminates soldering end of each coil. Low initial cost quickly saved, after which equipment pays dividends for years and years. Easily and quickly adjustable for different coil sizes and types. Simple, easy to operate. Takes the place of a multitude of makeshift wooden forms.



Ideal "Concentric" Coil Winding Head mounted on Ideal Coil Winder Drive, showing group of coils wound in series and tied ready for inserting in motor.

Ask About Free Trial Offer

IDEAL WIRE CONNECTORS

Solderless—tapeless. No open flame—no fire hazard! Makes joints quickly, easily and conveniently. More permanent and safe than a solder-and-tape joint. Better electrically—Stronger mechanically. Millions in use! Fully Approved. Listed by Underwriters' Laboratories.

IDEAL COMMUTATOR DRESSER CO.
1041 PARK AVE. SYCAMORE, ILLINOIS

New Glendale Manager

Walter Price has been made manager of the Glendale, Calif., Electrical Contractors Association. Mr. Price was at one time manager of the San Francisco association, and for the past several years has been engaged as manufacturers' representative and salesman in both Northern and Southern California.

Humane Society Notes

Once upon a time, says Ernest Blohm, of the Wadeford Electric Co., Chicago, a 500-ft. run of 4-in. conduit could not be fished. So Blohm put a light fishing line on a rat's tail, placed the rat in the conduit opening, and shoved a ferret in after the rat. Presto-quick action got wonderful results. The SPCA stopped all this, says Mr. Blohm, for fear a rat might some day lose such a raceway-race. Not bad, Ernest, for the younger generation of supers to learn about.

CAMDEN CHEER—In Camden, N.J., where radios, soups and ships are made, Mr. and Mrs. C. B. Edwards hold forth against Philadelphia across the Delaware. Mr. Edwards is a veteran of the motor shop industry in all its phases, while Mrs. Edwards rules over the office and purchasing details of the C. B. Edwards Electric Co. Here they are in their own plant, built to their liking, on their own ground, in 1927. The steel counter houses files and supplies. A glass panel was provided for a small display of items wanted by industrial drop-inners.

More Uniforms

Bearing the employee's name over the shirt pocket and the firm name on the back, the blouse-and-trouser uniforms of the Electrical Equipment Co., Inc., Richmond, Va., provide complete on-the-job identification for this company's service shop crew. Uniforms are changed twice weekly.

Motor Trouble

Many supposed fractional horsepower motor troubles, when checked up, only consist of poor contacts at the base of built-on over-current devices, says George C. Tatem of Electric Refrigerator Motor Co., Inc., Philadelphia.

7" Channeluminum Bus Bar, with welded joints, in plant of Wilson & Company

Where CHANNELUMINUM goes

Channeluminum is designed to carry the heavy loads and withstand short-circuit stresses that may occur. Strong, rolled channel sections mounted with flanges together form a ventilated hollow square approximating the ideal conductor shape.

Channeluminum is one form of Alcoa Aluminum Bus, sharing with tubes and flats the natural advantages of Aluminum. It is light, easy to place overhead out of the way with minimum support. It resists corrosion, an important point where sulphur gases, plating tank fumes, and other corrosive atmospheres are encountered. Joints are readily made by bolting or welding. Aluminum Bus requires only simple and inexpensive fittings.

Alcoa Aluminum Bus Bar is economical and dependable. ALUMINUM COMPANY OF AMERICA, 2197 Gulf Bldg., Pittsburgh, Pa.

ALCOA Reg. U. S. Pat. Off.

ALCOA · ALUMINUM

About NECA

Los Angeles Line-Up

Plans Announced for the 35th Annual NECA Convention at Biltmore Hotel, October 18th to 21st

The 35th Annual Convention of National Electrical Contractors Association to be held at the Biltmore Hotel in Los Angeles, California, on October 18th to 21st, gives promise of being one of the most widely representative national gatherings of the electrical contracting industry. Delegates are coming from every part of the United States and Canada and a splendid program of business and recreation has been arranged.

Although still two months away as this item is written, 145 paid reservations have been received for the NECA Convention Tour special train from Chicago to carry delegates from the eastern states. Equal interest is shown in reports from the other sections of the country.

A. L. Stone, National Executive Committeeman in Los Angeles, is General Chairman of the Convention Committee, assisted by able subcommittees of members of the Southern California Chapter, NECA. Mr. Stone submits the following as the tentative program of his Convention Committee, subject to such eleventh hour changes as the committee may find will make it even more enjoyable.

Sunday, October 17th

Arrival of special trains and auto caravans. Transportation facilities will be furnished to delegates desiring to visit friends or places of interest.

A new Douglas Airliner will be available to take delegates for an air trip over the city of Los Angeles and surrounding cities in groups of 25. "Seeing Los Angeles at night" is a breath-taking spectacle.

Monday, October 18th

For the Men—Convention sessions both morning and afternoon (open to all branches of the industry).

Joint luncheon meeting at noon with the Los Angeles Electric Club, Biltmore Hotel.

For the Ladies—All-day trip to Catalina Island, with luncheon served at the St. Catherine Hotel, Catalina, and trips in the glass-bottom boats or surf bathing at Avalon Bay.

For both Ladies and Men — Monday Evening—Dinner at Olvera Street Mexican Village, a unique bit of Mexico in the heart of Los Angeles. Following the dinner, delegates will be taken for a visit through some of the large Hollywood movie studios.

Tuesday, October 19th

For the Men—Open convention session in the morning only.

Afternoon—Golf tournament at the Pasadena Golf Club, with opportunity to visit the famous Rose Bowl en route.

For the Ladies—All-day auto tour covering Long Beach, Redondo, Venice, Ocean Park, Santa Monica, Beverly Hills, with luncheon served at the Knickerbocker Hotel in Hollywood; continuing through Glendale, Eagle Rock and other foothill cities and joining the men at Brookside Park, Pasadena.

For both Ladies and Men—Evening—Motor trip to the top of Mount Wilson where dinner will be served at the famous Mount Wilson Hotel, after which the Mount Wilson Observatory will be opened. All will be given a chance to inspect this marvelous observatory and observe some of the planets through the large telescope.

JOHN SCHUMACKER of Winnipeg, Canada, enjoying the hospitality of the Minnesota Electrical Association and Council at the summer meeting in Bemidji, Minn. Though now retired, by the doctor's orders, from active participation in his electrical contracting business, he continues his interest and activities in NECA as an executive committee member and travels the continent to keep in touch with industry leaders. After a brief stay at home he will head for Chicago to join with other members of NECA in a scenic trip to Los Angeles for the annual convention.

Wednesday, October 20th

For the Men—Closed business sessions both morning and afternoon—for electrical contractors only.

For the Ladies—Auto drive through the Orange Belt district, stopping at the famous Glenwood Mission Inn at Riverside for luncheon, returning through the Santa Ana Canyon in the early afternoon.

Annual evening NECA Banquet at the Hotel Biltmore, to be attended by all branches of the electrical industry.

Thursday, October 21st

Morning—Final convention session, open to all branches of the industry.

Afternoon—Left free for delegates and their ladies to do as they please.

Facilities will be furnished to the ladies in the morning to take small groups to visit any points of interest in the city, shopping districts in Hollywood or Los Angeles, the Griffith Park Planetarium, or any of the large universities. If there are any early risers who would enjoy a visit between 4.30 and 6.30 A. M. to the flower, vegetable and fruit markets, these are considered among the most interesting sights in the world.

Evening—Departure of NECA Convention Tour special trains for Yosemite, San Francisco, Portland and Seattle.

BUSINESS PROGRAM

Tentative Schedule of Topics and Speakers that will come before the Convention. And the Entertainment Program too.

Monday Morning

Opening of "Electrical Exposition Extraordinary."

Opening of Convention.

Invocation—

Address of Welcome
A. L. Stone, Chairman, Los Angeles Convention Committee.

President's Address: "Electrical Industry Promotion"
Earl N. Peak, President, National Electrical Contractors Association, Chairman, Electrical Industry Promotion Committee.

Discussion

Address: "A National Adequate Wiring Program"
National Adequate Wiring Bureau Representative

Discussion

Send for this NEW DATA

This recent literature, issued by leading electrical manufacturers, has been listed by number for your convenience. Please check on the post card any of this material you would like to receive. It will come to you without cost or obligation.

PORTABLE ELECTRICITY

1. A 38-page catalog on Bull Dog Universal Trol-E-Duct. Provides movable electrical outlets for flexible wiring layouts. Suggests hundreds of places where system can be installed. Many photographs, diagrams, charts and installation pictures. Bull Dog Electric Products Co.

H-H INHALATOR

2. Bulletin CA-3 describes the H-H Inhalator for use in the resuscitation of victims of carbon monoxide poisoning, gas asphyxia, electric shock, drowning and other uses. Mine Safety Appliances Company.

LINE NOISE SUPPRESSORS

3. A 32-page book, the Fifteenth Anniversary Edition of the Aerovox Catalog, lists its line of condensers together with essential resistors. Aerovox Corporation.

TURBINE AND STEAM PUMPS

4. Three new bulletins—No. 6920 deals with oil lubricated units, for most applications; No. 6920R covers water lubricated units, which are used where water must be kept pure and clean and oil lubrication is not permissible; No. 6205 describes duplex steam pumps for a wide range of pumping applications. Fairbanks, Morse & Co.

SQUIRREL CAGE MOTORS

5. A publication describing a new line of fan cooled Type CS Squirrel-Cage Motors. Gives applications, features, illustrations and diagrams. Descriptive Data 3105. Westinghouse Electric and Manufacturing Co.

ELECTRIC COUNTERS

6. Bulletin [illegible]-194, outlining non-reset Type EC-20 and reset Type EC-21 electric counters. Struthers Dunn, Inc.

CIRCUIT TESTING OHMMETER

7. Bulletin No. 1495 describes and illustrates the midget "Megger" circuit testing ohmmeter for measuring resistance, from as low as .1 ohm up to 200,000 ohms. (battery operated) James G. Biddle Co.

OIL DRIER AND FILTER

8. Folder GEA-1333A outlining transformer-oil drier and filter. Gives operating advantages, description, operation and accessories. Also illustrations. General Electric Co.

CUTTING AND THREADING MACHINES

9. A folder describing portable units for cutting and threading pipe and bolts. Wheel-and-roller cutoff or automatic knife cutoff. Installation pictures, performance data and features. Beaver Pipe Tools.

HARD-FACING PROCESS

10. A booklet entitled "Hard-Facing with Haynes Stellite Products" describes well over 500 money-saving applications of this hard-facing process. Also information on cutting tools and corrosion-resistant alloys. Haynes Stellite Company.

AIR CONDITIONING

11. Bulletins C-37 on All-Year-Air blower-filter unit for residential use. Provides forced air circulation for the furnace heated home. Gives illustrations, diagrams, performance data. Bulletin AB-37 describes Model A-37 for the warm-air-furnace-heated home. Air Conditioning Division, Auburn Automobile Co.

HOME WIRING

12. Bulletin No. 51-714 outlining alternate layout methods for wiring homes, stressing the provision of adequate copper. Illustrations of methods to follow. Lists wiring materials for home wiring installations. General Electric Company.

TIME CONTROLS

13. A folder describing controls for air conditioning, stokers, oil burners and refrigeration. Gives details, pictures and prices. Paragon Electric Company.

FANS AND VENTILATORS

14. Bulletin No. 1733 describing propeller fans and roof ventilators. Covers features, capacity tables and specifications, typical installations. Johnson Fan & Blower Corp.

OUTDOOR SWITCH HOUSES

15. Folder GEA-782D featuring outdoor switch houses complete

NO POSTAGE NEEDED

"Knowledge is power." Know the developments in your field. Circle the numbers of the items you want on reverse side of this card and mail today.

UMI

with switching and metering equipment. Ready for installation. Ratings 20,000 to 500,000 kva up to 15,000 volts and 2,000 amp. General Electric Co.

STOKER BOOK

16. Book No. 1469-B has sixteen pages on automatic heat. Contains series of illustrations from photographs taken in one of the homes heated by these stokers. Variable intermittent drive, airmeter automatic air control, automatic electric controls and other features. Link-Belt Company.

RESIDENCE, INDUSTRIAL AND RURAL WIRING

17. Second edition of "The Fact Manual of Standard Electrical Porcelain" rearranged and revised in a Wall Chart to illustrate the 1937 National Electric Code Revisions presenting all porcelain outlets, switch and receptacle boxes. Standard Electrical Porcelain Manufacturers.

LUMINAIRES

18. Bulletin GEA-2612 describing mercury-incandescent luminaires for street lighting. Facts about mercury lamps and their application to street lighting. Prices and ordering data. General Electric Company.

CONTROL APPARATUS

19. A loose leaf binder including Catalog No. 101 on safety switches, meter service and entrance switches, residence panelboards, multibreakers, meter troughs, magnetic motor control, manual starters and controllers, knife switches and fuse blocks, solderless connectors and panelboards. Revised price list and index No. 12. Supplement No. 1 covering drilling dimensions and data, on enclosed switches and lugs. Supplement No. 2 featuring open knife switches, fuse blocks, lugs and accessories. Trumbull Electric Mfg. Co.

ELECTRIC MOTORS

20. A 60-page book describing construction, features, advantages and applications of practically every type electric motor. Includes engineering data on various special motor applications and construction. Also detailed analysis of characteristics of squirrel cage motors, motors for centrifugals, etc. The Louis Allis Co.

REFLECTORS

21. Catalog No. 14 illustrates and describes outdoor floodlights, angle type and straight down type flush mounting reflectors, flush mounting unit, dust-tight floodlight, adjustable show window reflectors, sign lighting reflectors, dust-proof industrial concentrators, and enameled metal reflectors. Wilson Lighting, Inc.

CABLE

22. A 20-page booklet describing non-metallic sheathed cable for direct burial in the ground. Complete descriptions of types available and their uses and also helpful information relating to application, installation and other engineering data included. Anaconda Wire and Cable Company.

CABLE FITTINGS

23. Bulletin describing Anchor service cable fittings, including fold over type clips and sill plates. Specifications and trade prices. Anchor Manufacturing Co.

ELIMINATORS AND TRANSFORMERS

24. Bulletin B.E.T. 101 describing battery eliminators for telephone systems, intercommunicating phones, relays. Also transformers for signaling devices. Price list included. Telenco-Electricoil Co.

SOLDERLESS CONNECTORS

25. Describing and illustrating Types A and B Lugs, Type T Tap, Types O, S, H and K connectors. Pictures of applications of lugs and connectors. Hixon Electric Company.

POWER CONNECTORS

26. Bulletin No. 4074 describing power connectors. Illustrations and details on Types CS, XD, UT and PL. Burndy Engineering Co., Inc.

SPEED-MEASURING INSTRUMENTS

27. Bulletin 1505 outlines "Jagabi" speed indicator. Includes indicating tachometers, chronometric speed indicators and vibrating-reed tachometers. Illustrations and price lists are also given. James G. Biddle Co.

DIRECT CURRENT MOTORS

28. Bulletin 1033 describing direct current motors of 1 to 300 horsepower for constant, adjustable, and varying speed applications; continuous or intermittent service; open, semi-enclosed splash proof and fully enclosed ratings; horizontal, sleeve bearings with ring oilers; ball bearings; also vertical ball bearing. Century Electric Company.

WIND-DRIVEN GENERATOR

29. A 16-page folder describing the Wincharger, a wind-driven electric generator, for farm homes. Also small folders on radio reception, light batteries and appliances. Wincharger Corporation.

RETAIL SALES PRESENTATION

30. An additional volume of Water Heater Salesman's Library on automatic electric water heaters. Gives selling information, sales talks and facts pertaining to electric water heating. Westinghouse Electric & Manufacturing Co.

LIGHTING EQUIPMENT

31. A 200-page catalog No. 38 covering line of porcelain enameled lighting fixtures for industrial purposes. Also contains an engineering section with simplified data which includes floodlighting layouts and recommendations for illumination of many specialized and standard industrial jobs. Goodrich Electric Co.

SIGNAL DEVICES

32. Bulletin No. 103 describing Code Call system which sends a coded signal to all parts of building or plant. Also chime, light, quiet, bell, horn signals, both indoor and outdoor types. Gives installation data and wiring information. S. H. Couch Company, Inc.

DIESEL GENERATING SETS

33. Bulletin 3609-A2 describes and illustrates construction and application of Model 36-A Diesel generating sets, for use in industrial plants, either as independent units carrying entire load or for parallel or auxiliary operation in conjunction with other electrical service. Fairbanks, Morse & Co., Chicago.

BOOSTER REGULATOR

34. Catalog Section 47-230 describes the application, operation, construction and ratings of the four step feeder-voltage booster-regulator. For use on rural lines or distribution circuits where load changes over a wide range. Westinghouse Electric & Manufacturing Co.

CIRCLE NUMBERS-SIGN-AND MAIL

About NECA

[FROM PAGE 82]

Monday Noon

Joint luncheon with Los Angeles Electric Club.

Monday Afternoon

Address: "The Utility and the Qualified Contractor"
W. C. Mainwaring, General Sales Manager, British Columbia Electric Railway Co., Ltd., Vancouver, B. C.
Discussion

Address: "Facing the Market"
Earl Whitehorne, Editor, *Electrical Contracting*, New York City.
Discussion

Address: "Taking Adequate Wiring to the Public"
Walter L. Stickel, Electrical Development League of Southern California, Los Angeles.
Discussion

Tuesday Morning

Address: "Industrial Electrical Modernization"
K. D. White, Walker Electrical Co., Columbus, Ga.; Secy., Southeastern Industrial Chapter, NECA.
Discussion

Address: "I am your Customer"
William Cyr, Associate Editor, *Electrical West*, San Francisco.
Discussion

Address: "Highway Lighting — Why, Where, When and How"
A. V. Thompson, General Electric Co., San Francisco.
Discussion

Tuesday Afternoon

Golf Tournament

Wednesday Morning

(Closed Session for Contractors Only)

Election of Officers

For President, Vice President, Executive Committeemen for Divisions 1, 4, 7 and 10.

General Discussions:

1. "Apprentice Training"
(Led by report from J. W. Collins, Secy, Electrical Contractors Assn., Chicago.)
2. "Getting Your Competitor to Cooperate"
(Led by paper by J. Edward Chandler, Chandler Electric Co., Los Angeles.)
3. Open discussion

Wednesday Afternoon

(Closed Session for Contractors Only)

General Discussions:

1. "California Contractors License Law"
(Led by paper by Roy M. Butcher, electrical contractor, San Jose, Cal.; Chairman State Contractors License Board.)
2. "Meeting Motor Repair Shop Problems"
(Led by paper by Wm. J. Wheeler, The Maintenance Co., Inc., New York; President, National Industrial Service Association.)

"ROME CABLE"
BUILDING WIRE

Code, Intermediate, 30% and Superaging
•
Approved by the Underwriters Laboratories, Inc. N.E.C.S.
•
Flame and Moisture Resistant
•
Slick finish for Quick and Easy Pulling

Long Aging Rubber
•
Uniformly Small Diameters
•
Clean — Easy Stripping
•
Eight Clear Distinct Colors

ROME CABLE CORPORATION
330-400 RIDGE STREET, ROME, N. Y.

PRODUCTS — *Hot rolled copper rods, bare and tinned copper wire, bare and tinned strand, U. R. C. weatherproof wire, cotton, paper and asbestos magnet wire, rubber insulated wires and cords, lead covered cables.*
SALES OFFICES — *New York, Chicago, Philadelphia, Pittsburg, Richmond, Cleveland, Boston.*

No. 284 DUPLEX RECEPTACLE NOZZLE

With ½" brass pipe extension. Neatest and most compact fitting obtainable. Also available with ¾" pipe extension. Fullman also offers Duplex Telephone Nozzles.

No. 330 "Latrobe" Tom Thumb Utility Outlet

For use in wood floors, mantels, baseboards, etc.

A neat general purpose outlet, easy to install. Indispensable for small homes.

THE FULLMAN WAY IS THE *EASY WAY*

Easy installation saves time, money, and headaches on any job. Fullman offers a complete line of trouble-free floor boxes and wiring specialties for residential, commercial, and industrial application. Write for catalog.

"Latrobe" FLOOR BOXES
AND WIRING SPECIALTIES

FULLMAN MFG. CO.
LATROBE PENN.

LIGHT
the Job
WITH
Localite
Specialized
Engineered
UNITS FOR
EVERY
LOCALIZED
LIGHTING
NEED
NEW
FLEXIBLE
fostoria
LOCALITE
SEWING
MACHINE
LIGHTING UNIT
Regardless of line voltage this new Localite unit may be applied without alteration. It accommodates any double contact candelabra bayonet base lamp 2¾" or less in overall length. It is practically universal in application. Built primarily to match the actual requirements of sewing machine operators, this engineered unit is also suitable for many other uses, particularly where a small reflector is desirable. Several models are now available. Hundreds of installations have already proved their outstanding efficiency and utility.
Complete information on this specialized Localite unit and other units for every localized lighting need will be supplied promptly on request.
THE FOSTORIA PRESSED STEEL CORP.
FOSTORIA, OHIO

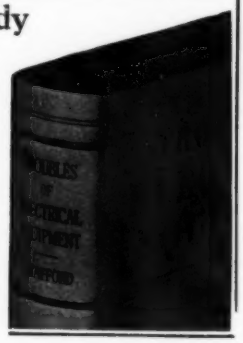
How to locate, diagnose and remedy electrical equipment troubles *quickly and accurately*

Just published

Troubles of Electrical Equipment

by H. E. STAFFORD
Consulting Engineer

330 *pages*, 297 *illustrations*, 22 *tables*, $3.00



THE book covers the symptoms, causes and remedy of troubles of both a-c and d-c apparatus usually found in the average industrial plant. Almost every chapter includes also priceless practical hints on efficient operation and maintenance. The book tells, for instance, what power factor is, what it does to an industrial-plant power load, how to control it. It points out the value of a load survey and tells how to make one. It shows how to locate power losses. This practical, how-to-do-it book is an indispensable job manual for the electrical maintenance man. All formulas are illustrated by practical examples and all technical terms are explained in everyday English.

Contains practical pointers on:

—winding faults in induction motors
—exciter troubles and remedies
—care and maintenance of commutators
—testing relays
—control of synchronous motors
—insulation-resistance tests, etc., etc.

10 DAYS' EXAMINATION—Send This Coupon

McGraw-Hill Book Co., Inc., 330 W. 42d St., N.Y.C.
Send me Stafford—Troubles of Electrical Equipment for 10 days' examination on approval. In 10 days I will send $3.00, plus few cents postage, or return book postpaid. (Postage paid on orders accompanied by remittance.)

Name .....
Address .....
City and State .....
Position .....
Company ..... E.C. 9-37
(Books sent on approval in U. S. and Canada only)

About NECA

[FROM PAGE 85]

3. "Association Work and How to Keep Members Interested"
(Led by paper by J. J. Newitt, Secy, Southern California Chapter, NECA, Los Angeles.)
4. Open discussion.

Wednesday Evening

Annual Banquet
Presentation of James H. McGraw Contractor-Dealer Award for 1937.
Entertainment.

Thursday Morning

Final Convention session (open to all branches of the industry.)
Greeting to Electrical Wholesalers of the Pacific Division, NEWA.
President Earl N. Peak, National Electrical Contractors Association.
Address: "The Wholesaler and the Contractor"
Harry L. Harper, Graybar Electric Co, San Francisco.
Discussion
Address: "An Electrical Industry Fair Trading Policy"
Ralph M. Walker, Walker Electrical Co, Atlanta; Chairman, Distribution Committee, NECA.
Discussion
Address: "New York's Plan of Merchandising Through the Dealer"
Speaker to be announced.
Discussion

NECA PERSONNEL ON ELECTRICAL COMMITTTE, N.F.P.A.

The following names have been submitted to Chairman Small to constitute the complete personnel of the NECA representation on the Electrical Committee, N.F.P.A., for the next two years. Announcement of assignments to Article Committees will be made as soon as confirmed by Chairman Small.

Allan Coggeshall, Member, Hatzel & Buehler, Inc., New York City.

Theo. H. Joseph, Alternate, E-J Electric Installation Co., New York City.

H. B. Frazer, Alternate, H. B. Frazer & Co., Philadelphia, Pa.

John H. Kuehne, Alternate, Kuehne Electric Co., Detroit, Mich.

George Andrae, Member, Herman Andrae Electrical Co., Milwaukee, Wis.

W. L. Fowler, Alternate, Fowler Electric Co., Cedar Rapids, Ia.

D. B. Clayton, Alternate, Mill & Mine Const. Co., Birmingham, Ala.

L. T. Souder, Alternate, Washington, D. C.

Material for this department is supplied by the headquarters staff of the National Electrical Contractors Association, 420 Lexington Avenue, New York.

Buy
Security for safety's sake! You can depend on Security to insulate and hold for the life of the job itself! Security makes good because it's made good by U. S. Rubber. Buy Security ...Security will stick by you.
NON-RAVELING
STRAIGHT TEARING
HIGH TENSILE STRENGTH
HIGHLY INSULATING
STRONG ADHESION
US
SECURITY
FRICTION TAPE
SECURITY
SECURITY BEYOND PRICE AND SPECIFICATIONS
US
UNITED STATES RUBBER COMPANY
TRADE MARK
United States Rubber Company
United States Rubber Products, Inc., 1790 Broadway, New York, N. Y.

WITH THE *Manufacturers*

Roller-Smith Appointments

Announcement has been made of the following appointments by the Roller-Smith Company of New York City—

H. R. Kimball will be district sales agent for New England, comprising Maine, Vermont, New Hampshire, Massachusetts and Rhode Island. His headquarters are 176 Federal St., Boston, Mass.

H. D. Seaton is made special agent in Tennessee with headquarters in the Volunteer Building, Chattanooga.

Ward Engineering Company, Inc., 1052 East Bay St., Jacksonville, is appointed special agent for the State of Florida.

•

Mercoid Corporation, Chicago, has recently appointed Loeffler-Greene Supply Co. of Oklahoma City as local distributor for its complete line of controls.

It has also opened a new office at 1035 Cathedral Street, Baltimore, Md. John Jex, Jr. will manage this office.

•

Graybar Electric Company of New York has announced the appointment of Martin Buehler, formerly manager at Minneapolis, as manager of the Dallas House. Earl Sharpe, formerly assistant manager at Minneapolis, has been appointed manager to succeed Mr. Buehler.

•

New Coil Winding Company

Orland Murphy, president, announces the organization of Electrical Windings, Incorporated, to specialize in the design and manufacture of all types of transformers, solenoids, chokes, magnets. The new company is set up to design coils and mountings for any specific purpose, or to work from manufacturer specifications. The offices will be located at 16 North May Street, Chicago.

Mr. Murphy was formerly associated with Utah Radio Products and Standard Transformer Corp., and has recently been chief engineer for Robertson-Davis.

Palmer Electric & Manufacturing Company, Waltham, Mass., moved to new headquarters in Wakefield, Mass. on September 1. The new factory provides 50,000 sq.ft. of floor space.

•

"How often have I got to tell you —?"

•

Porcelain Enamel & Manufacturing Co. of Baltimore has recently completed erection and put in operation the fourth unit of its battery of continuous smelters.

•

Bunting Brass & Bronze Company has moved its Kansas City branch sales offices and stockrooms to 1922 Grand Avenue.

Gordon Schutzendorf has been appointed sales representative in the Eastern territory, for this company. His headquarters will be in the New York City branch office.

•

Frank H. Swayze has been elected vice president and director of Domestic Sales of the Whitney Blake Company. His headquarters will be in New Haven, Conn. Mr. Swayze leaves the Graybar Electric Company after thirty-five years of consecutive service.

Cornell-Dubilier Electric Corp. has taken over the condenser manufacturing equipment and sales staff of the Electric Machinery Manufacturing Co., Inc. of Minneapolis.

•

Blazing Trails Beyond Power Lines

At State and County Fairs, Alfalfa Days and Corn-Husking Contests from the Appalachians to the Rockies, Canada to Gulf, Wincharger Corporation is pioneering beyond the power lines this summer to the farm population of America. Electricity on the farm will be exhibited at over thirty State and County Fairs, and many other local fairs.

Five crews are starting out to tell the story of wind-electric generating plants for the operation of lights, motors and radios and more than 22,000 miles will be covered. Four of the fair crews use half-ton trucks with which they transport the exhibits and display material. The Alfalfa Days are covered by two men who travel in a house trailer, making one day stands. It is estimated that by fall over 500,000 farmers will have been contacted.

•

B. J. Grigsby, president, announces the organization of Elsbert Manufacturing Co., Inc. with offices and factory at 353 West Grand Ave., Chicago. Other officers of the new company are Raymond J. Grigsby, vice president, O. E. Grigsby, secretary and H. E. Kranz, chief engineer. The company will shortly begin manufacture of a new type of slow speed, high torque, fractional horse-power electric motor also, ignition devices and systems.

•

SMOOTH SWITCHING — Boulder Dam employs twelve of the world's largest disconnecting switches, and to make them work smoothly, antifriction bearings play their part. Rated at 287,500 volts and 1200 amp., these switches have 428 ball bearings, and therefore employ only a ½-hp. motor to actuate them. S.K.F. Industries, Inc., made the bearings to suit the general switch design of the Bowie Switch Co.

This advertisement prepared by Commercial Advertising Agency Inc., Chicago

How Your Advertising Department Can Do A Bigger Job

Is your Advertising Department prepared to meet the challenge of today's complex conditions . . . to live up to its new opportunities . . . to assume broader responsibilities? Has it the training, the vision and the courage to do more than a routine job?

How your Advertising Department can do a bigger job will be the principal theme of the 15th Annual NIAA Industrial Advertising and Sales Promotion Conference and Exposition at the Edgewater Beach Hotel, Chicago, September 22 to 24, 1937. There will be talks by nationally known industrial leaders . . . by sales executives . . . and advertising directors. There will be speaking sessions, round table discussions, clinics on numerous specific topics, extensive exhibits of advertising and sales promotion materials, and rare opportunities for person to person exchange of ideas.

Are You a Top Executive?

This conference offers you a composite of management's experience with respect to industrial marketing trends . . . distribution practice . . . and directing Advertising and Sales Promotion Departments not only to sell merchandise, but also to do the urgent job of improving public relations. It will be a highly profitable investment for you to attend with your Sales Manager and your Advertising Manager.

Are You a Sales Director?

In addition to the foregoing, the NIAA conference offers you information on the most effective sales promotion policies and practices . . . the coordination of advertising with personal sales activities.

Are you an Advertising Manager?

From this conference, you will get inspiration . . . a broader viewpoint . . . a new vision of your opportunities, as well as "brass tack" information about various details of advertising and sales promotion.

An Ideal Convention Spot

The Edgewater Beach Hotel, the convention site illustrated above on the shores of Lake Michigan, offers unparalleled opportunities for fun and recreation . . . bathing, an abbreviated golf course, night clubs, etc. This conference, sponsored by the National Industrial Advertisers Association, will afford ample opportunity for entertainment, as well as work. *Mail Coupon Below.*

NIAA

• • 15TH ANNUAL ADVERTISING AND SALES PROMOTION CONFERENCE AND EXPOSITION

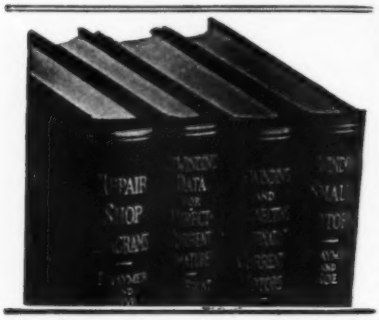
PTEMBER 22, 23, 24, 1937

MR. H. D. PAYNE, Chicago Molded Products Co.
2145 W. Walnut St., Chicago, Ill.

Please send further information about the program of the 1937 Conference and Exposition, sponsored by the National Industrial Advertisers Association.

Name .....

Company .....



NOW- how to repair and rewind all types of motors . . .

ELECTRIC MOTOR REPAIR LIBRARY

4 volumes, $10.00, payable in easy monthly installments

THIS set of books should be on the shelf of every man who ever has to touch a motor for purposes of repairing it or changing it to meet different operating conditions. In shop language and with practical shop methods it covers every step in stripping, rewinding and connecting a.c. and d.c. motors of all kinds.

Do you know how to:

—lay out a wave winding
—test a.c. and d.c. motors to locate grounds, shorts, opens, quickly and positively
—properly record data when stripping armatures so that it will be instantly usable for correct rewinding by yourself or any experienced winder at any time afterward
—determine how many coils can safely be cut out
—lay out single-phase fan motor windings
—change single-phase windings for two- or three-phase operation
—make cross or equalizer connections on lap windings
—lay out frog-leg windings
—handle every step in a rewinding job from the time it comes into the shop until it leaves
—wind stators for turbogenerators
—band high-speed armatures
—rewind motors for voltage, speed, frequency, or cycle changes
—etc., etc., etc.

1,079 pages of practical shop methods and data on jobs like these in this library. A complete, modern key to repair of all motors. Nothing else in it; every page filled with definite, practical facts for the industrial maintenance man and the electric shop worker.

How to change motors for different operating conditions

Here is all the information you need in order to determine what changes various types of motors permit; to lay out new windings for specified service conditions; and to handle every step in the work with satisfactory results.

Covers all types of motors, from those used in small household and commercial appliances of all kinds, to mining and railway motors. Explains principles underlying the different types of winding; gives definite instructions for doing the various rewinding jobs. Also gives many data, tables and diagrams constantly needed by the repair man, including data difficult to get from any other sources.

Low price—easy terms—10 days' examination on approval

Bought separately the books in this Library would cost you $11. By using this coupon you need pay only $2.00 in 10 days and $2.00 monthly until the special price of $10.00 is paid. In addition, we give you 10 days in which to examine the books. Send no money; simply fill in and mail the coupon now; let us know your answer after you have seen the books.

McGraw-Hill Book Co., Inc.
330 W. 42nd St., N. Y. C.

Send Electric Motor Repair Library for 10 days' examination on approval. In 10 days I will send $2.00, plus few cents postage, and $2.00 monthly for four months, or return books postpaid. (We pay postage on orders accompanied by remittance of first installment.)

Name .....

Address .....

City and State .....

Position .....

Company .....E.C. 9-37

(Books sent on approval in U.S. and Canada only.)

WITH THE Manufacturer

[FROM PAGE 88]

R. M. Beatty has been appointed manager of range sales for the Westinghouse Electric and Manufacturing Co. He will succeed J. D. Kelly, who has been transferred to New York for some special assignments. Mr. Beatty's headquarters will be in Mansfield.

•

Lincoln Electric Appointments

Lincoln Electric Company of Cleveland has announced the following appointments—

William F. Fisher has been made Sacramento representative. His headquarters are located at 1241-32nd Street.

Walter Dougan Wood, Jr., has been added to the sales staff at the Philadelphia Office.

R. P. Sharer has been put in charge of the new sales engineering office at Dayton, Ohio, which is located at 1508 Watervliet Ave.

•

During 1936, the Schenectady plant of the **General Electric Company** was visited by 131,961 perons, according to a report of the company's chief usher. These visitors registered from practically every state in the union and many came from foreign lands.

•

Harnischfeger Corporation, Milwaukee, announces the appointments of Francis Leslie and U. V. Westover as sales engineers in the New York territory.

G. W. Hoskins has joined this company, as sales engineer in the Philadelphia Territory. He was recently with Lincoln Electric Co.

•

H. F. Boe has been appointed commercial manager of the Westinghouse Electric and Manufacturing Co. He will have two headquarters, one in the Union Bank Building at Pittsburgh, the other at 150 Broadway, New York.

•

Warren Telechron Company of Ashland, Mass is opening a new Cleveland district office in the B. F. Kieth Building at 1621 Euclid Ave. H. E. Blackburn, Cleveland district manager, will be in charge.

BM
CONNECTORS and **COUPLINGS**
White Zinc Finish
For Electrical Metallic Tubing

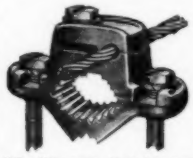
BRIEGEL METHOD TOOL CO.
GALVA, ILLINOIS

TELESCOPE BM SYSTEM

All you need to make perfect and economical installations with the one-half inch fittings is the Indenter No. 605 shown above or our Indenter No. 600 with interchangeable jaws for ½", ¾" and 1" fittings. Holders and Cutters are available though vises and hack saws can be used. The simplicity of using the B-M Connectors and Couplings is the reason for their popularity with Contractors. Write for details.

Distributed by:
THE M. B. AUSTIN CO.
Chicago, Illinois
CLAYTON MARK & CO.
Chicago, Illinois
CLIFTON CONDUIT CO.
New York City
GENERAL ELECTRIC CO.
Bridgeport, Connecticut
THE STEELDUCT CO.
Youngstown, Ohio
TRIANGLE CONDUIT & CABLE CO.
Elmhurst, New York City

SHERMAN
RIGID GROUND FITTINGS

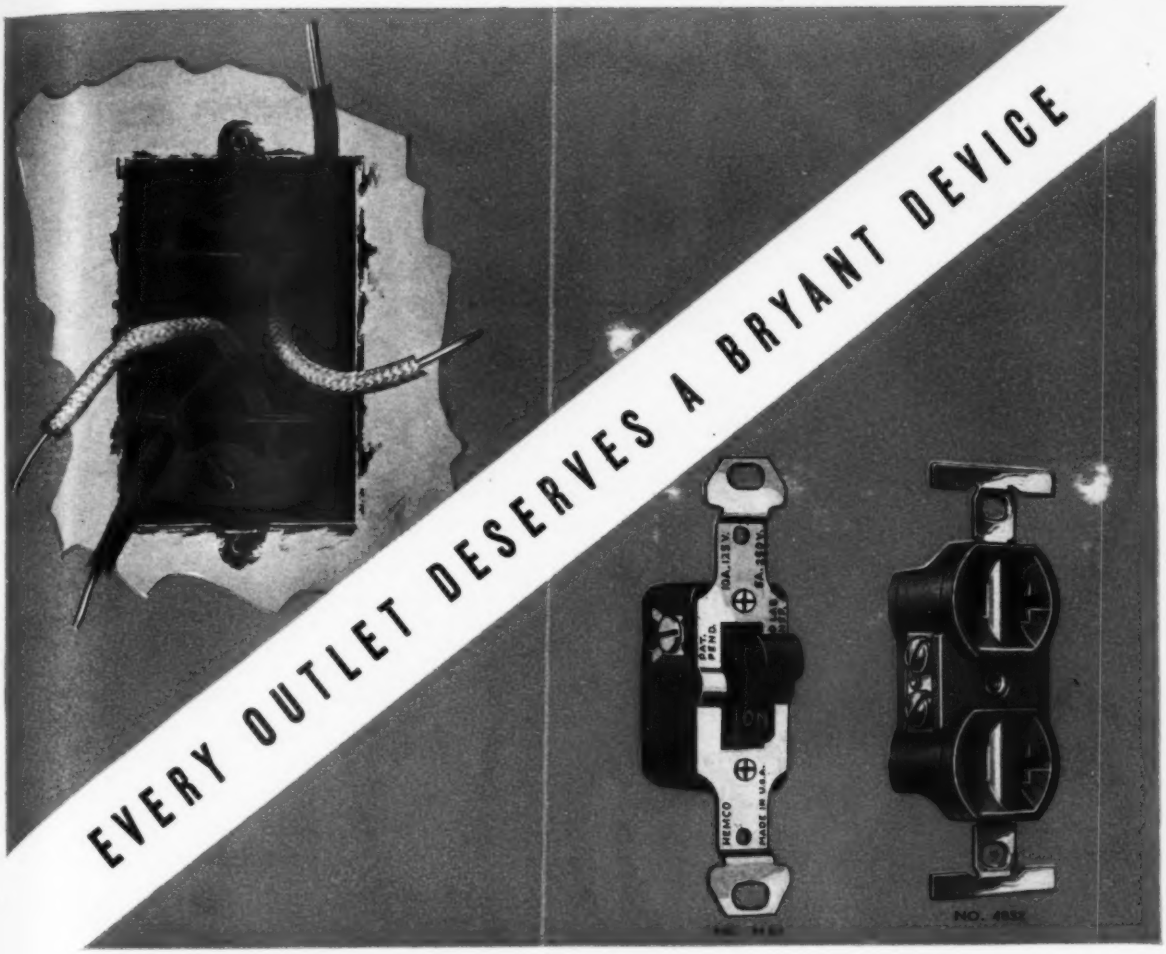


GF4 (illustrated) Solderless Fitting for Bare or Insulated Wire. Tight contact. Easy to install.

Dependable — practical — economical — absolute protection to ground wire connection — pipe clamp may be reversed for use with ground rod.

Send for Trade Bulletin No. 12, describing the complete line.

H. B. SHERMAN MFG. CO.
BATTLE CREEK, MICH.



Finish a good wiring job with
Bryant *Convenience*

Bryant convenience means putting the finishing touches on a good job with devices that bring to your customers — residential, industrial or commercial — the maximum in convenience and service.

BRYANT
WIRING DEVICES

For *YOUR* convenience the Bryant and Hemco lines offer devices *for every kind of job;* for every price level, and are designed for wiring ease.

The new Bryant easy-to-use catalog is so arranged as to service and price requirements that selecting or ordering is easy.

Sold Through Electrical Wholesalers

THE BRYANT ELECTRIC COMPANY · BRIDGEPORT, CONNECTICUT
NEW YORK 100 East 42nd St. · CHICAGO 344 West Adams St. · SAN FRANCISCO 325 Ninth St.

UMI

EQUIPMENT News

E. M. T. Fittings

The Kwikon line of connectors and couplings for electrical metallic tubing is designed with double set screws as fastening. This feature, eliminating the use of wrenches in making up runs of tubing, is claimed to save time in corners and other hard-to-get-at places. Set screws indent the tubing wall and are said to provide a securely locked and conductive fitting that is not affected by vibration. Made in ½-in., ¾-in. and 1-in. sizes. Kwikon Company, 626 West Jackson Blvd., Chicago, Ill.

KWIKON E.M.T. FITTINGS

■

Mobile Distribution System

Universal Type Trol-E-Duct is a flexible, adequate and mobile electrical distribution system designed for general lighting and light duty power applications. Consists of section lengths of formed steel duct enclosing copper bus bars partially wrapped in insulating material. Movable current-carrying trolleys and stationary twistout plugs to which lights, tools and appliances can be wired are inserted in a narrow continuous slot extending along one side of duct. With use of couplings, elbows, and caps, hangers and various other fittings, duct sections can be assembled and installed as compact, continuous and flexible distribution system. Lights can be shifted along duct runs to conform with illumination needs on floor areas. Bull Dog Electric Products Co., Detroit, Mich.

BULL DOG TROL-E-DUCT

REFLECTOR & ILLUMINATING FIXTURE

Lighting Fixture

Ster-Lite Fixture is a balanced combination of Sterling Lite-Flo reflectors and opal glass louvers, for commercial use. Reflectors direct light to working surfaces with minimum loss, louvers diffuse light to illuminate vertical surfaces. Streamlined appearance and more effective light per watt-hour of current used. Reflector & Illuminating Company, 1433 W. Hubbard St., Chicago, Ill.

■

G. E. PUSH-BUTTON STATION

Push-Button Station

A treadle-operated, watertight push-button station for installation where an operator must have both hands free, while starting or stopping his machine. Suitable for use in damp or wet locations. Available either with single-action or double-action treader. Foot-pedal provided with stops to limit travel in either direction. To eliminate moisture, packing gland is fitted on treadle shaft where latter enters case. Case arranged for conduit connections on either end that can be mounted directly on floor. Standard connections for ¾-in. conduit. General Electric Co., Schenectady, N. Y.

Outlet System

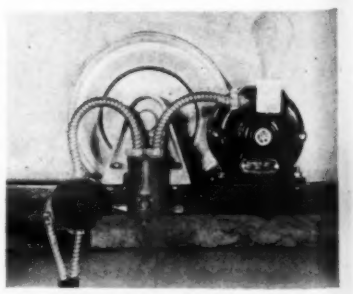
The "Plugmold" continuous outlet system consists of raceway with plug receptacles and other fittings. Raceway has channel which may be mounted either on surface or set into cement or plaster flush with surface, and cover which snaps into channel, forming flat top. Cover scored in three inch sections, length of receptacles. By breaking off scored sections and inserting receptacles, new outlets may be added where and when needed. Raceway with receptacles in place has capacity for 6 No. 12 wires and knockouts for ½-in. conduit or armored cable every eight inches. May be mounted on top of baseboard. For use in offices, retail display rooms and private homes. The Wiremold Company, Hartford, Conn.

WIREMOLD "PLUGMOLD"

■

Electric Door Opener

Flashings of car headlight upon a photo-electric eye puts the electric garage door opener into operation. May also be operated by a switch mounted upon a post, located at the side of driveway, reached from car window. Device causes garage doors to open and garage lights go on. A second, manually operated switch, placed inside home, also opens and illuminates garage and closes and locks garage and disconnects driveway switch or photo-electric eye. Available in three models, vertical, hinged and double hinged. R. W. Seed Manufacturing Co., Upper Darby, Pa.



SEED GARAGE DOOR OPENER

MODERN PLANS FEATURE *Safety*

NEW designs and new specifications for modern construction point definitely to a demand for *safety*. You can meet this specification by using electrical wires and cables manufactured by the American Steel & Wire Company for all your jobs.

Americore, Amparak, Amerite and Amperox Performite are wires that you can depend upon for long service. They are impervious to moisture. Heat does not soften them—nor do they crack in cold weather. You will find that they "pull" easily.

These wires are all protected by the well-known Safecote finish. This finish will not carry or support flame — an extra safety feature of unquestionable value.

Our building wires and cables are available in all standard colors. At your request we will furnish samples which will demonstrate to you their safety, economy, and durability. Send for our catalogue on Building Wires and Cables.

AMERICORE - - - - - - *Code*

AMERITE - - - - - - - *30%*

AMPARAK - - - - *Intermediate*

AMPERFORMITE - *U. S. Gov't. "Superaging-Grade"*

FLAME RETARDING
SAFE COTE
MOISTURE RESISTING

ELECTRICAL WIRES *and* CABLES

AMERICAN STEEL & WIRE COMPANY

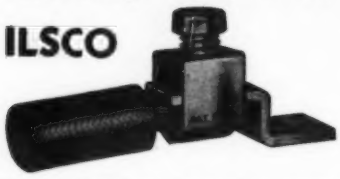
Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

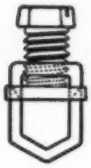
SIMPLE, ISN'T IT?

ILSCO



SOLDERLESS CONNECTOR

NOTICE: The ***triangular wedge*** formed by the tang and V-bottom collar which forces the wire into a ***solid mesh***—



NO set-screw contact . . .
NO flattening or separating of wires . . .
NO limitation to one size wire . .
NO shearing effect whatsoever . .
NO special tools required to make connection . . .

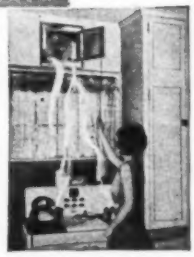
No need for you to search any longer for the PERFECT Solderless Connector—WE HAVE IT!

Ilsco solder lugs show the size of the largest wire they will take.

FREE—A large display board, containing mounted samples of ILSCO lugs. Sent upon request.

ILSCO COPPER TUBE & PRODUCTS, INC.
5629 Madison Road. Cincinnati. Ohio

Built-in
KITCHEN
VENT FAN



AUTOMATIC . . . EASY TO INSTALL . . . ADJUSTABLE *to wall thickness . . . no wood nor metal frame necessary . . . no screws in plaster, wood or brick needed to install.*

The 10-inch quiet type fan removes cooking odors, steam, smoke and excessive heat quickly and quietly—a vent fan in demand. Available for A. C. or D. C. current; A. C. type is non-radio interfering. Automatic switch and shutters are controlled by opening and closing of the door. Opening the door starts the motor and opens the shutters. Closing the door stops the motor and closes the shutters. Attractive finish—inside and outside frames are polished cast aluminum, adjustable for wall thickness 7" to 13"—special for walls 12" to 24" at small additional cost. We'll gladly send you complete information upon request.

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan
Offices in all principal cities

SIGNAL

EQUIPMENT News

[FROM PAGE 92]

Molded Plastic Fixture

The Commodore Luminaire is designed for use with 750, 1000 and 1500-watt lamps, employing a 26¼-in. molded Plaskon reflector that weighs but five pounds. The hanger is made of satin finished aluminum designed in proportion. Light weight, ease of maintenance, and the reduction of reflector breakage caused this line of lighting equipment to be developed. F. W. Wakefield Brass Co., Vermilion, Ohio.

GENERAL ELECTRIC LUMINAIRE

WAKEFIELD PLASKON LUMINAIRE

Service Station Luminaire

A totally enclosed gas-pump island luminaire for service stations. Unit equipped with rippled-glass globe. Detachable dome-shaped reflector conceals light source. Uses a 300- or 200-watt Mazda lamp. Equipped with a casting which fits a two-inch pipe; set screws used to clamp unit into place. Totally enclosed design prevents dirt from reducing efficiency of reflecting surface and amount of cleaning necessary. To relamp unit, thumb screws on reflector may be loosened and reflector removed. General Electric Company, Schenectady, N. Y.

■

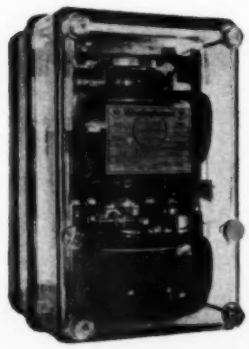
CHASE SHAWMUT FUSE

Non-tamperable Fuse

Non-tamperable plug fuse in two ranges (non-interchangeable) listed by Underwriters' Laboratories, requiring no changes in existing standards for cut-out bases. Adapters lock into present standard bases. Can be used without adapters when desired, eliminating need of carrying two types of plug fuses, since one type can be used to service both new and old installations. Also available with time-delay for motor circuits. Made in 0 to 15-amp. and 16 to 30-amp. ranges. All interchangeable in own range but not with fuses in other range. No concealed contacts. New contact surface provided every time a new fuse is inserted. Chase-Shawmut Company, Newburyport, Mass.

Directional Relay

This type CRS directional, overcurrent, negative phase, sequence relay is for use in place of conventional ground relay, when residual potential or current source is not available for polarizing the directional element. Consists of induction overcurrent element and induction type directional element. Eight terminals, two each for overcurrent element, current coil of directional element, potential coil of directional element, and trip circuit. Universal shockproof gravity operation target, is provided. Filter for deriving negative sequence quantities enclosed in sheet metal case for external mounting. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.



WESTINGHOUSE DIRECTIONAL RELAY

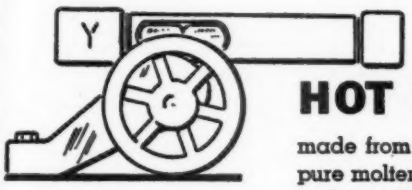
BIG PROFIT GUNS

Let these Shoot Down Your Costs

If you have considered that conduit is just a price proposition, there's a pleasant surprise waiting for you in Buckeye Conduit.

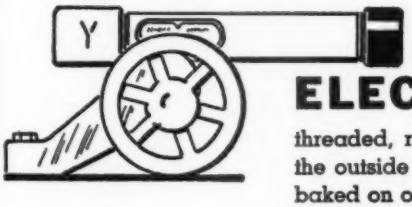
Find out for yourself how the correct combination of ductility and strength will let you set a bend quickly yet never throw a flat in the radius. Find out the speed that comes with clean chased and well protected threads. Find out how that smooth oven baked lacquer lining will let you push through many places where you should be snaking.

Ask for Buckeye by name, and get set for more speed and a better profit.



HOT GALVANIZED

made from selected pipe thoroughly pickled and cleaned. Galvanized in pure molten zinc, and specially processed for smoothness of coating, inside and out. Finally a tough coating of transparent enamel is baked on both inside and outside.



ELECTRO-GALVANIZED

threaded, reamed, inspected and cleaned, this conduit is galvanized on the outside only. The interior is coated with a tough elastic black enamel, baked on of course, but exceptionally flexible. Finally, transparent enamel is applied both inside and out.

BLACK ENAMELED

The same careful selection of pipe steel precedes this fabrication. The enamel is applied by dipping and is air set before baking. Oven control is accurately maintained by pyrometers to insure a high lustre tight coat that will be both tough and elastic.

BUCKEYE TRADE MARK YOUNGSTOWN CONDUIT

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels • **General Offices: Youngstown, Ohio**

CONDUIT • PIPE AND TUBULAR PRODUCTS • SHEETS • PLATES • TIN PLATE
BARS • RODS • WIRE • NAILS • UNIONS • TIE PLATES AND SPIKES

26-3

YOUNGSTOWN

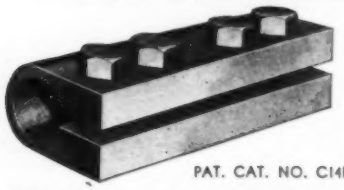
UMI

K&H

Solderless Terminal

LUGS

and connections



PAT. CAT. NO. C14P

SPLICING CONNECTOR

ACCURATELY MACHINED WITH ROUGHENED BORE. Four S A E cap screws supply means for tremendous clamping pressure. Quickly installed, easily taped and vibration-proof.

• **A connector for any job**
WRITE FOR COMPLETE CATALOG

• **A live wire is no better than its connections.**

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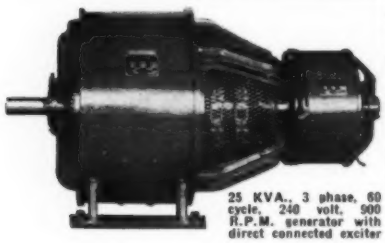


25 KVA., 3 phase, 60 cycle, 240 volt, 900 R.P.M. generator with direct connected exciter

A. C. Generators

Contractors and dealers alike find Columbia A.C. Generators a profitable item to handle. Their modern design and quality construction insure dependable operation under all conditions.

Columbia A.C. Generators are made in sizes of 1 to 100 KVA, single or three phase, and in a wide range of speeds. They are in use in many kinds of service. May we explain their many features and our liberal dealer plan to you?

COLUMBIA ELECTRIC MFG. CO.
4501 Hamilton Ave., Cleveland, Ohio

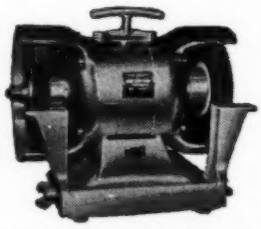
COLUMBIA
A. C. GENERATORS

EQUIPMENT News

[FROM PAGE 94]

Bench Grinder

6-in. junior, ball-bearing bench grinder, for shop use. Protected against dust and dirt by special bearing sleeves. May be bolted to bench or moved to convenient locations by carrying handle. Four rubber feet act as stabilizers. Includes one fine and one medium wheel (each 6-in. dia. by $\frac{1}{2}$-in. face by $\frac{1}{2}$-in. hole), also a 3-conductor cable (2 leads and 1 ground connection). Full $\frac{1}{4}$ hp. rating, except 25 cycle, which is $\frac{1}{3}$ hp. Available in all standard a.c. single phase voltages and cycles. Black & Decker Mfg. Co., Towson, Md.



BLACK & DECKER BENCH GRINDER

■

Wire Skinner

Handi-grip wire skinner to cut and strip insulation, scrape wire and straighten kinks and sharp bends. Hardened tool steel blades have cutting edges hollowed in center to prevent wire from slipping out of tool. Blades removable for resharpening. Aluminum handle hooks around fingers. Pulling is done entirely with handle, permitting sensitive pressure on blades for correct stripping. Ideal Commutator Dresser Co., Sycamore, Ill.

IDEAL HANDI-GRIP WIRE SKINNER

■

Contactors and Linestarters

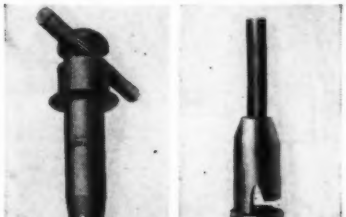
A line of midget contactors and linestarters consists of remote controlled, reversing and non-reversing magnetic starters, for small single phase and polyphase squirrel cage induction motors. Silver contacts provide long life and maximum conductivity. Thermal overload relay provides protection. Minute control current allows operation from 2 and 3-wire thermostats, pyrometers, pressure gauges etc. Westinghouse Electric & Manufacturing Co.. East Pittsburgh, Pa.

WESTINGHOUSE CONTACTORS & LINESTARTERS

■

Jumper Clamps

Burndy Redheads, Type HW and HR, are live line jumper clamps, completely insulated in unbreakable soft rubber of high dielectric strength. Designed for shunting defective equipment, by-passing low voltage substation apparatus, for grounding, tapping, jumping faulty cutouts and disconnect switches, taking up slack and replacing old poles with new ones. Each type furnished in two sizes for 1/0 and 4/0 maximum line size. Burndy Engineering Co., Inc., 459 East 133d St., New York

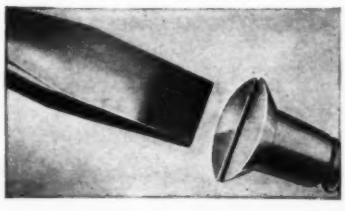


BURNDY REDHEAD

■

Screw Driver

New screw driver, modern in design and utility, features the NON-SKID point. Streamlined handle built to grip firmly. Blades made of chrome vanadium alloy spring tempered steel. Rust-proof finish. It is claimed that it does not jump out of the screw slot and damage the screw as well as damage smooth and polished surfaces and injuries to fingers and hands. Bridgeport Hardware Manufacturing Corp., Bridgeport, Conn.



BRIDGEPORT HARDWARE SCREW DRIVER

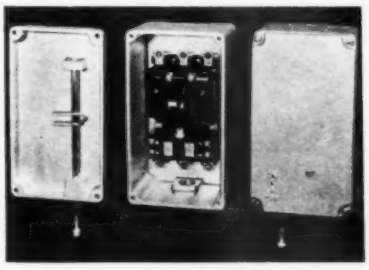
Canopy Lighting Unit

The canopy localite was developed to provide a relatively large spread of diffused illumination with minimum of brightness and glare from the light source. Made with three sizes of luminaires—20, 40 and 60 inches long. Recommended for installations where reflection from bright surfaces is a problem, such as in metal scribing, type setting, plate etching, bottle and glass ware inspection, candy manufacture, etc. Fosteria Pressed Steel Corporation, Fostoria, Ohio.

FOSTORIA CANOPY LOCALITE

Watertight Box

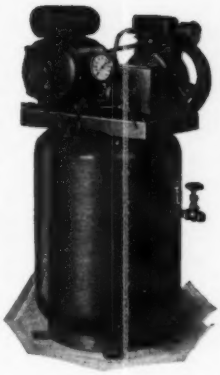
A watertight or splash proof box to house a standard Westinghouse motor start switch. Nothing new in design but manufactured to sell at a low price. R. E. S. Swam & Co., Hanover, Pa.



SWAM WATERTIGHT BOX

Air Compressors

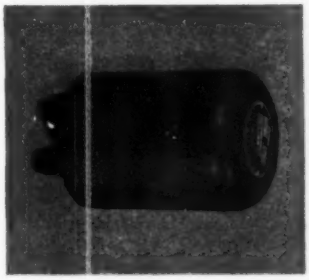
A new line of fractional horsepower air compressors in ¾ and ½ horsepower sizes. Automatic start and stop control, equipped with seamless steel tank and improved check valve. For single phase current, equipped with brushless capacitor type motor and built-in automatic protection switch, giving overload and under-voltage protection. Rated for 150 pounds per sq.in. maximum pressure. May be set for lower pressures or equipped with reducing valve for still lower pressures. Ingersoll-Rand Company, Phillipsburg, N. J.



INGERSOLL RAND AIR COMPRESSORS

Ignition Transformer

Ignition transformer designed for all types of oil-burner installations. Special brackets for underslung installations. Adaptable to streamlined burner installations with secondary connections enclosed. Minimum space consumption. Sola Electric Company, Chicago, Ill.



SOLA IGNITION TRANSFORMER

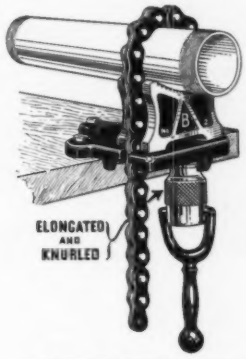
Rubber Angle Plug

Molded rubber angle plug for use with lamps, clocks and small appliances. At right angles on cord, allowing cord to lie close and flat against wall or baseboard when plug is inserted in outlets. Plug and cord molded together in one small piece. General Electric Company, Bridgeport.

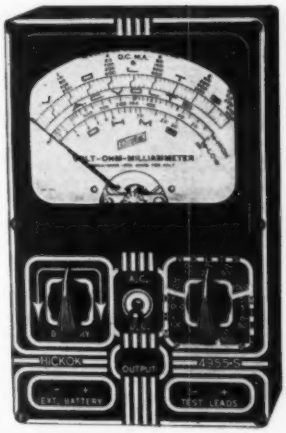
G-E MOLDED RUBBER ANGLE PLUG

Chain Pipe Vise

Chain pipe vise with heavily knurled and elongated adjustment nut, providing a gripping surface for taking up slack in chain. Partial turn of handle clamps pipe. No interference between handle and bench. Made of steel; base, handle and jaws drop forged. Four sizes with capacities from ½-in. to 8-in. Billings & Spencer Co., Hartford. Conn.



BILLINGS & SPENCER VISE



HICKOK VOLT-OHM-MILLIAMMETER

Volt-Ohm-Milliammeter

Model 4955-S volt-ohm-milliammeter instrument for general circuit testing on both a.c. and d.c. circuits. Special low ohms range tests radio speaker coils, R.F. coils, I.F. coils. Consists of 350 micro-ampere movement and rotary switch eliminates jacks. Scale ranges a.c. or d.c. are volts, 0-10, 0-50, 0-250, 0-500 and 0-1000. Ohms, .05-30, .5-10,000, 50 ohms to 1 mehogm, 500 ohms to 10 megohms. D.c. milliamperes, 0-1, 0-5, 0-50, 0-500. Resistor built in to read 10 megohms with external battery. A.c. voltmeter usable as output meter using same scale as a.c. volts. Unit complete, self-contained, with rheostat to adjust meter to batteries outside. Four foot leads fit all tube sockets. Hickok Electrical Instrument Co., Cleveland, Ohio.

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Synchronous

Electric TIME SWITCH LINE

★ Dependable, accurate, simple in construction and built to give many years of satisfactory service, these time switches fully meet each need. It is generally known that they are easy to install and operate economically. Approved by Underwriters' Laboratories. Reasonably priced.

See your wholesaler or write for complete descriptive literature

RELIANCE AUTOMATIC LIGHTING CO.
1937 Mead Street Racine, Wis.

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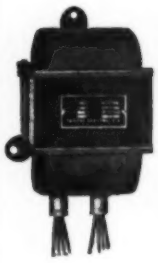
AIR-COOLED
TRANSFORMERS



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Increase Profits

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Stock sizes ¼ to 50 Kv-a. Other sizes built to order.

Write for literature with diagrams and prices.

SORGEL ELECTRIC CO.
No. Plankinton Ave., Milwaukee, Wis.

EQUIPMENT News

[FROM PAGE 97]

Magnetic Starter

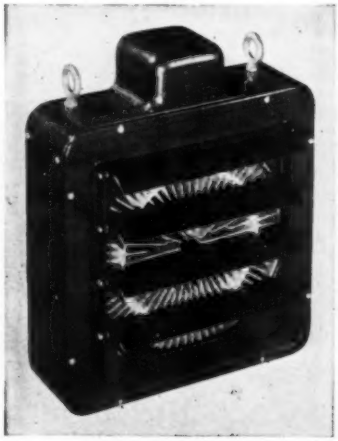
A.C. magnetic starters, compact with round corner housing designed for installation on machinery. Has low voltage protection on 3-wire control and under voltage release on 2-wire control. If voltage fails, switch opens and shuts down the motor. With 3-wire control it is necessary to push start button to start the motor after voltage returns to normal, guarding against the hazard of motors starting until power is wanted. Arrow-Hart & Hegeman Electric Co., Hartford, Conn.

ARROW-HART & HEGEMAN STARTER

■

Industrial Heater

Electromode industrial heater (Model IBN) features single, cast, circular grid, a cast aluminum fan housing and stronger housing construction. Heat source is cast aluminum grid, poured around a calrod heating element. Eliminates hot wires and dead air space, assuring economical and safe operation. Motor driven, four-bladed aluminum fan. Heat can be directed wherever needed by moving series of adjustable deflectors mounted on front of unit. Equipped with an "on" and "off" switch and thermal safety switch to prevent damage to grid from overheating should fan stop. Thermostatic control, insures maintenance of constant temperature. Unit may be suspended from ceiling or fastened to wall. American Foundry Equipment Co., Mishawaka, Ind.



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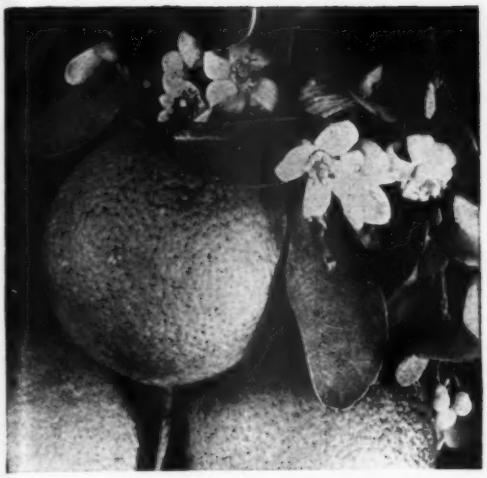

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with

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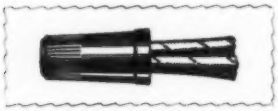

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